Joint Pacific Alaska Range Complex

Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska

Volume II – Appendices A through L

Final **June 2013**

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How to Use This Document

Our goal is to provide a reader-friendly document. The organization of this Final Environmental Impact Statement (Final EIS) is shown below.

VOLUME I

Table of Contents, List of Figures, List of Tables, List of Acronyms, and Executive Summary

Chapter 1 Purpose and Need for Joint Pacific Alaska Range Complex (JPARC) Proposed Actions: Explains the reasons for the proposed enhancements and modernizations and the screening criteria used to select proposals from the *JPARC Master Plan* for this EIS. Also described is the Environmental Impact Analysis Process, the consultation and public involvement processes, a table of where scoping comments are addressed, and a comparative analysis of the anticipated impacts of the proposed actions and alternatives.

Chapter 2 Description of Proposed Action and Alternatives: An overview of the JPARC EIS definitive and programmatic proposed actions and alternatives.

Chapter 3 Affected Environment and Environmental Consequences: Describes the environmental resources and areas that could potentially be affected by each proposed action, analysis methodology and potential impacts.

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- **Noise**
- **Safety**
- **Air Quality**
- **Physical Resources**
- **Water Resources**
- **Hazardous Materials and Waste**
- **Biological Resources**
- **Cultural Resources**
- **Land Use**
- **Infrastructure and Transportation**
- **Socioeconomics**
- **Subsistence**
- **Environmental Justice**

Proposed actions:

- Fox 3 MOA Expansion and New Paxon MOA
- Realistic Live Ordnance Delivery
- Battle Area Complex (BAX) Restricted Area
- Expand Restricted Area R-2205, including the Digital Multi-Purpose Training Range (DMPTR)
- Night Joint Training
- Unmanned Aerial Vehicle (UAV) Access
- Enhanced Ground Maneuver Space
- Tanana Flats Training Area (TFTA) Roadway Access
- Joint Air–Ground Integration Complex (JAGIC)
- Intermediate Staging Bases (ISBs)
- Missile Live Fire for AIM-9 and AIM-120 in the Gulf and Alaska
- Joint Precision Airdrop System (JPADS) Drop Zones

Chapter 4 Cumulative Impacts and Secondary Effects: Summarizes the aggregated effects of multiple JPARC proposed actions, as well as the cumulative effects associated with other past, present, and reasonably foreseeable military and civilian actions.

Chapter 5 Other Considerations Required by NEPA: Discussions on short-term use of man's environment in relation to long-term productivity and irreversible or irretrievable commitment of resources.

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Appendix A Public Scoping Summary: Describes the public review process during EIS scoping.

Appendix B Resource Definitions and Regulatory Settings: Provides applicable regulations related to JPARC enhancements.

Appendix C Conflict of Interest Statements: Contains disclosure statements from consulting firms supporting this EIS, stating financial or other interests that might cause a conflict of interest.

Appendices D-J: Technical appendices that include reports and information that support the EIS analyses.

Appendix K Mitigations: A discussion of existing and proposed measures to minimize impacts.

Appendix L Copies of Agency and Government Correspondence: Copies of letters exchanged with government agencies, including consultation, coordination, and cooperating agency correspondence.

VOLUME III

Appendix M Draft EIS Review Public Process and Public Hearing Summary: Draft EIS and public hearing notification, informational, and summary materials.

Appendix N Draft EIS Comments and Responses: Copies of Draft EIS public comments and hearing transcripts, plus responses to substantive comments.

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Public Scoping Summary

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ACRONYMS AND ABBREVIATIONS

ADNR	Alaska Department of Natural Resources
AGL	above ground level
ALCOM	Alaskan Command
BAX	Battle Area Complex
BLM	Bureau of Land Management
CACTF	Combined Arms Collective Training Facility
EIS	environmental impact statement
FAA	Federal Aviation Administration
GMU	Game Management Unit
ISB	Intermediate Staging Base
JAGIC	Joint Air-Ground Integration Complex
JCALF	Joint Combined Arms Live Fire
JPADS	Joint Precision Airdrop System
JPARC	Joint Pacific Alaska Range Complex
IFR	Instrument Flight Rule
IICEP	Interagency/Intergovernmental Coordination for Environmental Planning
MOA	Military Operations Area
NEPA	National Environmental Policy Act
NJT	Night Joint Training
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
RLOD	Realistic Live Ordnance Delivery
RPA	Remotely Piloted Aircraft
TFTA	Tanana Flats Training Area
UAV	Unmanned Aerial Vehicle
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance

APPENDIX A
PUBLIC SCOPING SUMMARY

A.1 *FEDERAL REGISTER* NOTICE OF INTENT

76444 Federal Register / Vol. 75, No. 235 / Wednesday, December 8, 2010 / Notices

[FR Doc. 2010–30732 Filed 12–7–10; 8:45 am]

BILLING CODE 5001–06–C

DEPARTMENT OF DEFENSE

Department of the Air Force

Environmental Impact Statement (EIS) for Construction and Operation of a Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) at the Summit of Mauna Kea, HI

ACTION: Cancellation of Pan-STARRS EIS.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321, *et seq.*), the Council on Environmental Quality Regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulation (CFR) Parts 1500–1508), and U.S. Air Force (USAF) policy and procedures (32 CFR part 989), the USAF issued a notice on 10 Jan 07 advising the public of its intent to prepare an EIS evaluating potential environmental impacts associated with construction and operation of the proposed Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) by the University of Hawaii (UH) Institute for Astronomy (IfA). Pan-STARRS was to be a USAF-funded, UH IfA research program to discover, characterize and track Near-Earth Objects (NEOs), primarily asteroids and comets, whose trajectories pass close enough to Earth that they may pose a danger of collision.

FOR FURTHER INFORMATION CONTACT: Please direct any written comments or requests for information to Ms. Connie Rankin, Office of Public Affairs, 377 ABW/PA, 3550 Aberdeen Ave., SE., Kirtland AFB, NM 87117–5776 (Phone: 505–846–4321; e-mail *Connie.Rankin@kirtland.af.mil*).

Bao-Anh Trinh,

GS–14, DAF, Air Force Federal Register Liaison Officer.

[FR Doc. 2010–30760 Filed 12–7–10; 8:45 am]

BILLING CODE 5001–10–P

DEPARTMENT OF DEFENSE

Department of the Air Force

Department of the Air Force and U.S. Army; Notice of Intent To Prepare an Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska

ACTION: Notice of Intent.

SUMMARY: The U.S. Air Force and U.S. Army, on behalf of Alaskan Command (ALCOM), are issuing this notice to advise the public of their intent to prepare an environmental impact statement (EIS) evaluating potential environmental impacts associated with modernizing and enhancing current military ground and air training assets in Alaska.

This notice is published pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C] 4321, *et seq.*); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations (CFR) 1500–1508); Executive Orders 11514 and 11991; the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 *et seq.*); the Air Force Environmental Impact Analysis Process (32 CFR 989); and the "Environmental Analysis of Army Actions" (32 CFR 651). This Notice of Intent describes the Air Force's and Army's scoping process and identifies ALCOM's point of contact.

In accordance with the U.S. Department of Defense (DoD) Directive 1322.18, *Military Training*, and Commander U.S. Pacific Command (PACOM), Joint Training Program of Excellence, ALCOM as DoD's regional joint headquarters in Alaska, has coordinated with the Services to develop a joint strategy to identify joint training opportunities in Alaska, maximize the utilization of training resources, and improve joint training. The JPARC Modernization and Enhancement EIS will evaluate the elements of this strategy which are reasonably foreseeable.

At present, the Joint Pacific Alaska Range Complex (JPARC) consists of all land, air, and sea training areas used by the Army, Navy, and Air Force in Alaska. The military uses the JPARC to conduct testing, unit-level training, and to support various joint exercises and mission rehearsals. The JPARC was originally developed to support cold war weapons, tactics, and techniques. Its current configuration cannot fully meet the training requirement for forces and exercises located in Alaska. The proposed JPARC enhancements would enable realistic, joint training and testing to support emerging technologies, respond to recent battlefield experiences, and train with tactics and new weapons systems to meet combat and national security needs. JPARC enhancements would enable the Services to train realistically and jointly so military personnel could succeed in their mutually supportive combat roles when exposed to situations faced in actual combat.

The proposal would modernize existing military training and testing capabilities located in the interior of Alaska through expanding and/or establishing new Military Operations Areas, restricted airspace, airspace corridors, ground maneuver training areas, and training complexes to provide adequate airspace and controlled-access land to test and train under realistic and varied conditions. The EIS will analyze the environmental effects of the proposed changes and their alternatives.

All of the actions proposed in this EIS are independent of each other and have stand-alone value for improving training operations. While full implementation of all the proposed actions is desired and would result in the greatest training benefit for aircrew and ground troop training, each of the proposals, if implemented alone, would have a positive effect on the use and/or management of JPARC. Depending on decisions made and the availability of funding, it is possible that some of the actions being proposed could be implemented soon after a Record of Decision (ROD) is issued, some actions could be implemented quite some time after the ROD is issued, some actions may be deferred until such time as they are ripe for decision, and some proposed actions may not be implemented. The following projects are those currently proposed to be addressed in the *JPARC Modernization and Enhancement EIS.*

Fox 3 Military Operations Area (MOA) Expansion and New Paxon MOA: The Air Force and Army propose to expand the Fox 3 MOA and establish a new, adjacent Paxon MOA to provide the vertical and horizontal airspace structure needed to better accommodate low-altitude threat and multiple-axis mission activities during JPARC training exercises. The Air Force and Army intend to consider the following alternatives, as well as a No Action Alternative: Alternative A includes the proposed expanded Fox 3 MOA and the proposed new Paxon MOA with both

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the high- and low-altitude MOAs; Alternative B includes only the Fox 3 MOA expansion (as in Alternative A) without the new Paxon MOA; Alternative C includes the Fox 3 MOA expansion without the low-altitude MOA; Alternative D proposes keeping the Fox 3 MOA boundaries the same as they currently exist, but separating the MOA into four subdivided sectors, as well as high- and low-altitude MOAs. The low-altitude MOA would extend from 500 feet above ground level (AGL) up to, but not including, 5,000 feet AGL. The high-altitude MOA elevation

Realistic Live Ordnance Delivery: As the range and lethality of modern weapons increase, so do the amounts of training area and airspace required to safely and effectively train with these weapons. The current ranges and restricted airspace of the JPARC are not capable of supporting realistic training with modern and emerging weapons. The Army and Air Force propose to establish a realistic air and ground training environment that would accommodate live ordnance delivery of modern and emerging weapons by considering the following alternatives, as well as a No Action Alternative: Alternative A proposes the use of existing targets in the Oklahoma Impact Area within Restricted Area 2202 (R–2202) with the expansion of this restricted airspace to the west to encompass the airspace and underlying lands; Alternative B proposes that live ordnance delivery make use of existing targets at the Oklahoma and Blair Lakes Impact Areas with new restricted airspace established that links R–2211 and R–2202. Based on the ceiling altitude of R–2211 as flight level (FL) 310 and the upper altitude of R–2202 being FL310, the proposed altitude for the restricted airspace linking these two restricted areas would also be FL310. Higher altitudes may be required for some live-fire ordnance profiles; Alternative C proposes weapons corridors through the Eielson Military Operations Area and overlying air traffic control assigned airspace that would provide two protective pathways for live ordnance use within the Oklahoma Impact Area. These corridors would be approximately 10 miles in width and extend from FL200 to FL310, as needed, to accommodate the delivery altitudes of the ordnance types being delivered.

Joint Combined Arms Live Fire (JCALF): Current tactics and techniques established in the Iraq and Afghanistan theaters of operation require the Army to regularly integrate attack aviation into collective and unit-level training. There are currently no facilities available in the JPARC which are capable of supporting this type of training. The Army proposes to establish restricted airspace to support JCALF training over the Battle Area Complex (BAX) located in the Donnelly Training Area (DTA), near Delta Junction, and the Digital Multipurpose Training Range located in the Yukon Training Area (YTA). The Army and Air Force intend to consider the following alternative, as well as a No Action Alternative, or other reasonable alternative developed during scoping: Alternative A proposes to establish new restricted airspace over the BAX in the DTA to support controlled firing areas and new restricted airspace located within YTA. This restricted airspace would provide protective areas for the hazardous activities and weapons surface danger zones of sufficient size for the types of ordnance used.

Night Joint Training: Combat situations during the hours of limited visibility require using advanced night vision technology. Training with this equipment can only be conducted at night. The Army and Air Force intend to consider the following alternatives, as well as a No Action Alternative: Alternative A proposes to extend the special use airspace hours to accommodate night training for major flying exercises (MFE) during March and October. The hours are currently set to cease training activities by 10 p.m., with landing by 11 p.m., local time; Alternative B proposes to extend the JPARC operating hours to allow tactical flight operations until midnight and landing by 1 a.m., local time, during March and October. This would allow night training during these months from a minimum of 1.5 hours to a maximum of 2.5 hours for each exercise; Alternative C proposes to extend the JPARC operating hours to allow tactical flight operations until midnight and landing by 1 a.m., local time, during all months of the year and for all training purposes, not just for MFEs, as is the current situation.

Remotely Piloted Aircraft (RPA)/ Unmanned Aerial Vehicle (UAV) Access: RPA/UAVs conduct reconnaissance and surveillance activities; RPA/UAV access throughout the JPARC ranges and airspace is critical to enhance JPARC training and exercises. The following RPA/UAV corridors have been developed as individual, standalone proposed actions and alternatives: Eielson Air Force Base (AFB) to Restricted Area 2211 (R–2211); Eielson AFB Class D airspace to R–2205; Allen Field to R–2202; R–2202 to R–2211; R–2205 to R–2202; Fort Wainwright to R–2211; and Fort Wainwright to R–2205. The Air Force and Army intend to consider the following alternatives, as well as a No Action Alternative: Alternative A would establish new restricted airspace for each RPA/UAV corridor identified above; Alternative B would establish restricted airspace via a Certificate of Authorization, or other suitable airspace designated by the Federal Aviation Administration for each RPA/UAV corridor identified above.

Enhanced Access to Existing Maneuver Space: Services currently lack year-round accessibility in the Tanana Flats, Donnelly, and Yukon Training Areas. The Army and Air Force intend to consider the following alternatives, as well as a No Action Alternative: Alternative A follows the proposed railroad alignment 11 miles and crosses the Tanana Flats along an existing winter-access trail to higher ground around Blair Lakes; Alternative B follows the proposed railroad alignment 8 miles before crossing the Tanana Flats toward Hill 1406. The route traverses the eastern slopes of Hill 1406, then a broad terrace southeast toward Blair Lakes, crossing Dry Creek near Blair Lakes; Alternative C follows existing trail systems southwest across the Tanana Flats toward Hill 1406, avoiding open areas as much as possible. From Hill 1406, two possible routes to Blair Lakes are being considered: The first traverses the eastern slopes of Hill 1406 and then a broad terrace southeast toward Blair Lakes, crossing Dry Creek near Blair Lakes; the second route remains on the flats north of Hill 1406, crossing Dry Creek where the creek enters the flats, then running up the Dry Creek Valley to the higher ground around Blair Lakes; Alternative D is similar to Alternative C, except it takes a more direct route from the Tanana River toward Hill 1406. From Hill 1406, two routes to Blair Lakes are being considered: The first traverses the eastern slopes of Hill 1406, then a broad terrace southeast toward Blair Lakes, crossing Dry Creek near Blair Lakes; the second route remains on the flats north of Hill 1406, crossing Dry Creek, and then running up the Dry Creek Valley to higher ground around Blair Lakes.

Joint Air-Ground Integration Complex (JAGIC): The Army requires a facility to train and test air and ground combat units on skills necessary to detect, identify, and effectively engage targets while directing Attack Aviation as in actual combat. A modern facility designed to support this type of training does not exist in the JPARC. The Army proposes to develop the JAGIC to provide this capability. The Army and Air Force intend to consider the following alternatives, as well as a No Action Alternative: Alternative A

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proposes to locate the JAGIC in the central area of Donnelly Training Area-West, proximate to the western boundary of the Oklahoma Impact Area; Alternative B proposes to locate the JAGIC in the Stuart Creek Impact Area within the Yukon Training Area; Alternative C proposes to locate the JAGIC in the Blair Lakes Impact Area near the southern boundary of the Tanana Flats Training Area under the existing Restricted Area 2211 (R–2211).

Intermediate Staging Bases (ISBs): Currently, Soldiers and airmen spend up to 6 hours traveling to and from training sites within the JPARC. This travel reduces available training time and increases risks of traffic accidents. The Army proposes to locate and construct a 1,000- Soldier ISB near the existing Battle Area Complex (BAX), along with three 200- to 500-Soldier ISBs at Yukon Training Area (YTA), Donnelly Training Area-West (DTA-West), and Salcha to reduce travel time, increase safety, and increase available training time. The Army and Air Force intend to consider the following alternatives, as well as a No Action Alternative: Alternative A proposes to provide a permanent 1,000-Soldier ISB near existing BAX, along with three permanent 200- to 500-Soldier ISBs at YTA, DTA-West, and Salcha. The facility is intended for joint use. ISBs are proposed at key points along the planned rail corridor close to the planned bridge crossings; Alternative B proposes to use existing temporary "relocatable" ISB facilities over the next 7 years, and then replace them with permanent facilities.

Missile Live Fire for AIM–9X and AIM–120: The AIM–9X and AIM–120 missile systems are the main air-to-air armaments for the F–22 Raptor and F–15 Eagle. For effective training to be conducted with these systems, live training shots need to be executed as part of both individual pilot training and joint training exercises with other air and ground units. The Air Force and Army intend to consider the following alternative, as well as a No Action Alternative, or other reasonable alternative developed during scoping: Alternative A proposes to consider the existing Temporary Maritime Activities Area (300 nautical miles [NM] long by 150 NM wide; 0 feet above ground level [AGL]—flight level (FL) 600; includes subsurface operating areas), and Warning Area 612 (WA–612) (0 feet AGL–FL290) in the Gulf of Alaska for the missile live fire delivery of the AIM–9X and AIM–120 missiles by Air Force F–22 fighter aircraft.

Joint Precision Airdrop System (JPADS) Drop Zones: JPADS is a GPS [global positioning system]-guided precision airdrop system designed to deliver supplies and equipment to ground forces. JPADS is not currently used within the JPARC. Alaska-based airmen with the requirement to train on JPADS must currently travel to Yuma Proving Grounds in Arizona to conduct this training. The Army and Air Force propose to establish JPADS drop zones as part of JPARC training exercises. The Army and Air Force intend to consider the following alternatives, as well as a No Action Alternative: Alternative A proposes conducting JPADS operations at a reduced altitude sufficient to ensure the airdrop land within Restricted Area 2205 (R–2205) in the Yukon Training Area; Alternative B proposes conducting JPADS operations at a reduced altitude sufficient to ensure the airdrop land within in the Donnelly Training Area Oklahoma Impact Area. (The key distinction between Alternatives A and B is that R–2205 currently has more time and space available to accommodate JPADS drop zone training exercises.) The EIS will address environmental consequences to airspace, noise, safety, biological resources, socioeconomics, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice and risks to children, subsistence, and cumulative impacts. Public and agency scoping may identify other environmental resources for consideration in the EIS.

The Army and Air Force will invite the Bureau of Land Management, Environmental Protection Agency, Federal Aviation Administration, National Marine Fisheries Service, National Park Service, and U.S. Fish and Wildlife Service to be cooperating agencies in preparation of this EIS.

ALCOM will coordinate government-to-government consultation with Federally recognized Tribes, following DoD policy.

Scoping Meetings: The Army and Air Force, with the support of ALCOM, will conduct public scoping meetings in communities likely to be affected by the proposed action to solicit public and agency input. The purpose of scoping is to obtain public, Alaska Native, and government input on the proposed action and alternatives, as well as to gain a better understanding of the potential issues and concerns related to this proposal. The schedule and locations of the scoping meetings are provided below:

Thursday, January 13, 2011: 6:30–8:30 p.m., Millennium Hotel, 4800 Spenard Road, Anchorage, Alaska.

Tuesday, January 18, 2011: 6:30–8:30 p.m., Caribou Hotel, Mile 186.5 Grand Highway, Glenallen, Alaska.

Wednesday, January 19, 2011: 6:30–8:30 p.m., Alaska Steakhouse and Hotel, 1420 Alaska Highway, Delta Junction, Alaska.

Thursday, January 20, 2011: 12–2 p.m. and 4–8 p.m., Princess Hotel, 4477 Pikes Landing Road, Fairbanks, Alaska.

Monday, January 24, 2011: 6:30–8:30 p.m., Motel Nord Haven, 249 George Parks Highway, Healy, Alaska.

Tuesday, January 25, 2011: 6:30–8:30 p.m., Swiss Alaska Inn, 22056 South F Street, Talkeetna, Alaska.

Wednesday, January 26, 2011: 6:30–8:30 p.m., Menard Memorial Sports Center, 1001 S. Mack Drive, Wasilla, Alaska.

Federal, State, and local agencies and interested groups, Alaska Native organizations, and individual persons are invited to attend the scoping open house meetings. All are encouraged to provide comments on the proposed actions either at the scoping meetings, by mail, or electronically, postmarked or electronically submitted no later than February 4, 2011, to ensure consideration in the draft EIS. All comments received during this scoping period will be considered in the preparation of the draft EIS.

Point of Contact: Please direct any written comments or requests for information to ALCOM Public Affairs, 9480 Pease Avenue, Suite 120, JBER, AK 99506, Phone: 907–552–2341, Fax: 907–552–5411 or submit them electronically at *http://www.jparceis.com.* You may also request handicap assistance or translation services for the public scoping meetings in advance through the ALCOM Public Affairs Office.

Bao-Anh Trinh,

Air Force Federal Register Liaison Officer.

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DEPARTMENT OF DEFENSE

Defense Acquisition Regulations System

Waiver of 10 U.S.C. 2534 for Certain Defense Items Produced in the United Kingdom

AGENCY: Defense Acquisition Regulations System, Department of Defense (DoD).

A.2 INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING (IICEP) LETTERS AND DISTRIBUTION LISTS

A.2.1 IICEP Letter—Agency Letter and Distribution List

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

December 10, 2010

Lieutenant General Dana T. Atkins
Headquarters Alaskan Command
9480 Pease Avenue
JBER, Alaska 99506

Dear Interested Party:

The U.S. Army and U.S. Air Force, on behalf of Alaskan Command (ALCOM), are jointly issuing this letter to advise government agencies, representatives, and the public of their intent to prepare an environmental impact statement (EIS) evaluating the potential environmental consequences associated with modernizing and enhancing current military ground and air training assets in Alaska.

In accordance with the U.S. Department of Defense (DoD) Directive 1322.18, *Military Training*, and Commander U.S. Pacific Command (PACOM), Joint Training Program of Excellence, ALCOM, as DoD's regional joint headquarters in Alaska, has coordinated with the Services to develop a joint strategy to identify joint training opportunities in Alaska, maximize the utilization of training resources, and improve joint training. The *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska (JPARC Modernization and Enhancement EIS)* will evaluate the elements of this strategy that are reasonably foreseeable.

At present, the Joint Pacific Alaska Range Complex (JPARC) consists of all land, air, and sea training areas used by the Army, Navy, and Air Force in Alaska. The military uses the JPARC to conduct testing and training and to support joint exercises and mission rehearsals. The JPARC was originally developed to support cold war weapons, tactics, and techniques. Its current configuration cannot fully meet the training requirement for forces and exercises located in Alaska. The proposed JPARC enhancements would enable realistic joint training and testing to support emerging technologies, respond to recent battlefield experiences, and train with tactics and new weapons systems to meet combat and national security needs. JPARC enhancements would enable the Services to train realistically and jointly so military personnel could succeed in their mutually supportive combat roles when exposed to situations faced in actual combat.

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The proposal would modernize existing military training and testing capabilities located in the interior of Alaska through expanding and/or establishing new Military Operations Areas, restricted airspace, and airspace corridors; expanding access to training areas; and developing new ranges and facilities to provide adequate resources to conduct training. The EIS will analyze the environmental effects of the proposed changes and their alternatives. Projects currently proposed to be addressed in the *JPARC Modernization and Enhancement EIS* are presented in Attachment 1. The EIS will address environmental consequences to airspace, noise, safety, biological resources, socioeconomics, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice and risks to children, subsistence, and cumulative impacts. Public and agency scoping may identify other environmental resources for consideration in the EIS.

ALCOM will coordinate government-to-government consultation with federally recognized tribes, following DoD policy. The Army and Air Force will invite the Bureau of Land Management, Environmental Protection Agency, Federal Aviation Administration, National Marine Fisheries Service, National Park Service, and Fish and Wildlife Service to be cooperating agencies in preparing the EIS. All cooperating and other interested government agencies are invited to attend either an Anchorage or a Fairbanks Agency Meeting at the times and locations listed below. The meetings are being held to provide clarity on the JPARC proposed actions, collect information, learn about agency concerns, and invite questions. Both meetings will begin with a half-hour open house and then proceed to a question and answer session prior to lunch. In the afternoon, the open house will resume and subject matter experts will be available to discuss specific technical topics.

Anchorage Agency Meeting	Fairbanks Agency Meeting
January 14, 2011 The Millennium Alaskan Hotel 4800 Spenard Road Anchorage, Alaska 99517-3236 10 a.m. to noon and 1:00 to 5:00 p.m.	January 21, 2011 Princess Fairbanks Hotel 4477 Pike's Landing Road Fairbanks, Alaska 99709 10:00 a.m. to noon and 1:00 to 5:00 p.m.

Recognizing that open communication of issues is a critical element of the EIS process, the Army and Air Force, with the support of ALCOM, will host public meetings in communities likely to be affected by the proposed action, as identified in the meeting flyer in Attachment 2. Meetings with public, agency, and Alaska Native stakeholders during scoping will help identify the full range of reasonable alternatives, potential impacts, and key issues to be considered in the environmental impact analysis process (EIAP).

As an additional effort to inform the public of these meetings, we request your assistance in posting the enclosed flyer in a visible place within your community. The scoping meetings will be in an open house format, in which military representatives will (1) describe the proposed action and alternatives, (2) explain the National Environmental Policy Act, (3) outline opportunities for public involvement, and (4) answer questions about the proposal.

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Public, Alaska Native, and agency comments received during the meetings, as well as written comments received during the scoping period and throughout the EIAP, will be considered in preparing the EIS. Comments will be accepted at any time during the EIAP; however, to ensure that the Army and Air Force have sufficient time to consider your input in the preparation of the draft EIS, please provide information and/or comments before February 4, 2011. To allow for the holidays, ALCOM has extended the comment period by a month. Please submit comments to ALCOM Public Affairs by mail at 9480 Pease Avenue, Suite 120, JBER, AK 99506; by phone at 907-552-2341; or by fax at 907-552-5411. You may also submit comments and obtain information, including the two attachments to this letter, from our website at www.jparceis.com. Thank you in advance for your assistance in this matter.

Sincerely,

DANA T. ATKINS
Lieutenant General, USAF
Commander

3 Enclosures:

1. JPARC Proposed Activities and Maps
2. Scoping Meeting Location Flyer
3. Distribution List

IICEP Letter – Agency Distribution List

Federal Agencies

Anchorage Air Route Traffic Control Center
The Honorable Larry EchoHawk, Assistant Secretary of the Interior for Indian Affairs, Bureau of Indian Affairs
Bob Abbey, Director, Bureau of Land Management
Thomas Lonnie, District Manager, Bureau of Land Management
Tammy DeFries, Fire Management Officer, Bureau of Land Management – Alaska Fire Service
Tim Hammond, Division Chief, Resources and Minerals, Bureau of Land Management – Central Yukon Field Office
William Hedman, Archaeologist, Bureau of Land Management – Central Yukon Field Office
Shelly Jacobson, Field Manager, Bureau of Land Management – Central Yukon Field Office
Skip Theisen, Fire Management Officer, Bureau of Land Management – Central Yukon Field Office
Jim Herriges, Wildlife Biologist, Bureau of Land Management – Eastern Interior Field Office
Gary Foreman, Planning and Environmental Coordinator, Bureau of Land Management – Fairbanks District Office
Bob Schneider, District Manager, Bureau of Land Management – Fairbanks District Office
Michael Bromwich, Director, Bureau of Ocean Energy Management, Regulation and Enforcement
Mike Nuckols, Environmental and Safety Specialist, Cold Region Testing Center
Phillip Kaspari, Agriculture Extension Agent, Delta Junction District
Joel Neimeyer, Federal Co-Chair, Denali Commission
Bill Rice, Community Planner, Eielson AFB, 345 CES/CEAOP
Malcolm Nason, Chief, Asset Management, Eielson AFB, 353 CES/CEA
Ruth Forrester, Base Environmental Planner, Eielson AFB, 354 CES
Joe Weathersby, Chief Asset Optimizer, Eielson AFB, 354 CES
Randy Babbit, Administrator, Federal Aviation Administration
Bob Lewis, Regional Administrator, Federal Aviation Administration, Alaska Region
Gregory Holt, Deputy Regional Administrator, Federal Aviation Administration, Alaska Region
Brian Lance, Regional Administrator, National Marine Fisheries Service
Dr. Jane Lubchenko, Administrator, National Oceanic and Atmospheric Administration
Jon Jarvis, Director, National Park Service
Sue Masica, Director, National Park Service
Joanne Kuykendall, District Conservationist, Natural Resources Conservation Service
Joseph Pizarchik, Director, Office of Surface Mining Reclamation and Enforcement
Admiral Christopher Colvin, Sector Commander, United States Coast Guard
Mary Pete, Commissioner, US Arctic Research Commission, University of Alaska Fairbanks, Kuskokwim Campus
Mary Jane Fate, Past Commissioner, US Arctic Research Commission
Kevin Gardner, Director of Public Works, US Army Alaska
Christy Everett, Field Office Manager, US Army Corps of Engineers
Dave White, Chief, US Department of Agriculture - Natural Resources Conservation Service

Robert N. Jones, State Conservationist, US Department of Agriculture - NRCS
The Honorable Gary Locke, Secretary, US Department of Commerce
The Honorable Janet Napolitano, Secretary, US Department of Homeland Security
Pamela A. Bergmann, Regional Environmental Officer, US Department of the Interior
Ken Salazar, Secretary, US Department of the Interior
Harry Kieling, Regional Director, US Department of the Interior, Office of Aircraft Services
Lisa Jackson, Administrator, US Environmental Protection Agency
Jacques Gusmano, Site Manager, US Environmental Protection Agency, Region 10
Dennis McLerran, Regional Administrator, US Environmental Protection Agency, Region 10
Deborah Rocque, Field Supervisor, US Fish and Wildlife Service
US Fish and Wildlife Service - Endangered Species Program
Rowan Gould, Acting Director, US Fish and Wildlife Service - Headquarters
Ruth Monahan, Acting Regional Forester, US Forest Service
Tom Tidwell, Chief, US Forest Service
Nicholas Pardi, Regional Director, US Minerals Management Service
Dan Miller, Chief, DPW Environmental, USAG Fort Greely

State Agencies

Vince Webster, Chair, Alaska Board of Fisheries
Karl Johnstone, Vice Chair, Alaska Board of Fisheries
Bill Brown, Board Member, Alaska Board of Fisheries
John Jensen, Board Member, Alaska Board of Fisheries
Tom Kluberton, Board Member, Alaska Board of Fisheries
Mel Morris, Board Member, Alaska Board of Fisheries
Mike Smith, Board Member, Alaska Board of Fisheries
Cliff Judkins, Chair, Alaska Board of Game
Ted Spraker, Vice Chair, Alaska Board of Game
Teresa Sager Albaugh, Board Member, Alaska Board of Game
Lewis Bradley, Board Member, Alaska Board of Game
Ben Grussendorf, Board Member, Alaska Board of Game
Nate Turner, Board Member, Alaska Board of Game
Facilities Oversight, Alaska Department of Environmental Conservation
Dan Easton, Deputy Commissioner, Alaska Department of Environmental Conservation
Latrisha Jennings, Office Assistant, Alaska Department of Environmental Conservation
Fred Vreeman, Environmental Program Manager, Alaska Department of Environmental Conservation
Deb Caillouet, Environmental Program Specialist, Division of Spill Response and Prevention, Alaska Department of Environmental Conservation
David James, Regional Supervisor, Alaska Department of Fish and Game
Fisheries Biologist, Alaska Department of Fish and Game
Stephen DuBois, Wildlife Biologist, Alaska Department of Fish and Game
Tom Seaton, Wildlife Biologist, Alaska Department of Fish and Game
Don Young, Wildlife Biologist, Alaska Department of Fish and Game
Bill Glanz, Chair, Central Advisory Committee, Alaska Department of Fish and Game
Don Horrell, Chair, Copper Basin Advisory Committee, Alaska Department of Fish and Game

Don Quarberg, Chair, Delta Advisory Committee, Alaska Department of Fish and Game
Marty Caress, Chair, Denali Advisory Committee, Alaska Department of Fish and Game
Andy Bassich, Chair, Eagle Advisory Committee, Alaska Department of Fish and Game
Virgil Umphenour, Chair, Fairbanks Advisory Committee, Alaska Department of Fish and Game
Stephen Darilek, Chair, Matanuska Valley Advisory Committee, Alaska Department of Fish and Game
Brent Keith, Chair, Middle Nenana River Advisory Committee, Alaska Department of Fish and Game
Ron Silas, Chair, Minto/Nenana Advisory Committee, Alaska Department of Fish and Game
Thomas Payton, Chair, Mt. Yenlo Advisory Committee, Alaska Department of Fish and Game
John Schandelmeier, Chair, Paxson Advisory Committee, Alaska Department of Fish and Game
Steve Runyan, Chair, Susitna Valley Advisory Committee, Alaska Department of Fish and Game
Thumper Williamson, Chair, Tok Cutoff/Nabesna Advisory Committee, Alaska Department of Fish and Game
Terry Brigner, Chair, Upper Tanana/40 Mile Advisory Committee, Alaska Department of Fish and Game
Jon Van Hyning, Chair, Whittier Advisory Committee, Alaska Department of Fish and Game
Kalei Brooks, State Public Information Officer, Alaska Department of Military and Veterans Affairs
Major General Thomas Katkus, Adjutant General and Commissioner, Alaska Department of Military and Veterans Affairs
McHugh Pierre, Director of Communications, Alaska Department of Military and Veterans Affairs
Ed Fogels, Director, Alaska Department of Natural Resources
Franci Havemeister, Director, Alaska Department of Natural Resources - Division of Agriculture
James King, Director, Parks and Outdoor Recreation, Alaska Department of Natural Resources
Dan Sullivan, Commissioner, Alaska Department of Natural Resources
Andre Kaeppele, Snowmobile Trails Coordinator, Alaska Department of Parks and Outdoor Recreation
Bill Luck, State Trails Coordinator, Alaska Department of Parks and Outdoor Recreation
Joseph Masters, Commissioner, Alaska Department of Public Safety
Leo von Scheben, Commissioner, Alaska Department of Transportation and Public Facilities
John Madden, Director, Alaska Division of Homeland Security and Emergency Management
Ted Leonard, Executive Director, Alaska Industrial Development (AIDEA)
General Joe Ralston, Member, Alaska Military Advocacy and Structure Team
Major Guy Hayes, Chief of Public Affairs, Alaska National Guard
Mike Burns, Executive Director, Alaska Permanent Fund Corporation
Colonal Audie Holloway, Director, Alaska State Troopers
Colonal Gary Folger, Director, Alaska Wildlife Troopers
Monica Alvarez, Planning officer, Chugach State Park
Richard Sewell, MBA–Aviation Policy Planner, Division of Alaska Statewide Aviation
Christine Klein, Deputy Commissioner, Division of Statewide Aviation
Jesse Vanderzanden, Manager, Fairbanks International Airport

Dr. James Conner, Air Quality Specialist, Fairbanks North Star Borough
The Honorable John Katz, Director of State/Federal Relations, State of Alaska
John Parrot, Manager, Ted Stevens Anchorage International Airport
Carol Diebel, Museum Director, University of Alaska Museum of the North

Local Agencies

Jeff Bouton, Planner, Fairbanks North Star Borough Historic Preservation Commission
Michael Cox, Director, Fairbanks North Star Borough Parks and Recreation
Greg Jones, Community Planning and Development, Municipality of Anchorage
Jane Dale, Manager, Palmer Airport
William Sheffield, Port Director, Port of Anchorage
Bryce Wrigley, District Manager, Salcha-Delta Soil and Water Conservation District
Bob Sattler, Senior Archeologist and Environmental Quality Analyst, Tanana Chiefs Conference
Executive Director, Tanana Yukon Historical Society

A.2.2 IICEP Letter—Congressional Delivery and Governor Letters and Distribution List

HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

10 December 2010

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
Joint Base Elmendorf-Richardson AK 99506-2101

The Honorable Mark Begich
United States Senate
144 Russell Senate Office Building
Washington D.C. 20510-0201

Dear Senator Begich

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Sincerely

Dana T. Atkins

DANA T. ATKINS
Lieutenant General, USAF

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3. Distribution List

HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

10 December 2010

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
Joint Base Elmendorf-Richardson AK 99506-2101

The Honorable Lisa Murkowski
United States Senate
709 Hart Senate Office Building
Washington D.C. 20510-0201

Dear Senator Murkowski

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Lieutenant General, USAF

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HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

10 December 2010

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
Joint Base Elmendorf-Richardson AK 99506-2101

The Honorable Don Young
United States House of Representatives
2111 Rayburn House Office Building
Washington D.C. 20510-0201

Dear Congressman Young

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HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

10 December 2010

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
Joint Base Elmendorf-Richardson AK 99506-2101

The Honorable Sean Parnell
Governor of Alaska
Alaska State Capitol Building
P.O. Box 11001
Juneau AK 99811-0001

Dear Governor Parnell

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United States Congress

U.S. Senate

The Honorable Mark Begich, Senator, United States Senate
The Honorable Lisa Murkowski, Senator, United States Senate

U.S. House of Representatives

The Honorable Don Young, Congressman, House of Representatives

State Government

Governor

The Honorable Sean Parnell, Governor, State of Alaska

A.2.3 IICEP Letter—General Letter to Federal, State and, Local Representatives and Distribution List

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

December 10, 2010

Lieutenant General Dana T. Atkins
Headquarters Alaskan Command
9480 Pease Avenue
JBER, Alaska 99506

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December 10, 2010
Page 2

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December 10, 2010
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Sincerely,

DANA T. ATKINS
Lieutenant General, USAF
Commander

3 Enclosures:

1. JPARC Proposed Activities and Maps
2. Scoping Meeting Location Flyer
3. Distribution List

IICEP Letter – General Distribution List

United States Congress

U.S. Senate

David Ramseur, Chief of Staff, Office of Senator Mark Begich
Susanne Fleek, State Director, Office of Senator Mark Begich
Lindsay Kavanaugh, Military Legislative Assistant, Office of Senator Mark Begich
Tom Moyer, District Representative, Office of Senator Mark Begich
Karen Knutson, Chief of Staff, Office of Senator Lisa Murkowski
Althea St. Martin, District Representative, Office of Senator Lisa Murkowski
Kevin Sweeney, State Director, Office of Senator Lisa Murkowski

U.S. House of Representatives

Michael Anderson, Chief of Staff, Office of Congressman Don Young
Lanien Livingston, Field Representative, Office of Congressman Don Young
Chad Padgett, District Director, Office of Congressman Don Young

State Agencies and Officials

Alaska State Government

Governor

Michael Nizich, Chief of Staff, Office of Governor Sean Parnell

State Senate

The Honorable Bert Stedman, Senator, Alaska Senate, District A
The Honorable Dennis Egan, Senator, Alaska Senate, District B
The Honorable Albert Kookesh, Senator, Alaska Senate, District C
The Honorable Joe Thomas, Senator, Alaska Senate, District D
The Honorable Joe Paskvan, Senator, Alaska Senate, District E
The Honorable John Coghill, Senator, Alaska Senate, District F
The Honorable Linda Menard, Senator, Alaska Senate, District G
The Honorable Charlie Huggins, Senator, Alaska Senate, District H
The Honorable Fred Dyson, Senator, Alaska Senate, District I
The Honorable Bill Wielechowski, Senator, Alaska Senate, District J
The Honorable Bettye Davis, Senator, Alaska Senate, District K
The Honorable Johnny Ellis, Senator, Alaska Senate, District L
The Honorable Hollis French, Senator, Alaska Senate, District M
The Honorable Lesil McGuire, Senator, Alaska Senate, District N
The Honorable Kevin Meyer, Senator, Alaska Senate, District O
The Honorable Catherine Giessel, Senator-Elect, Alaska Senate, District P
The Honorable Thomas Wagoner, Senator, Alaska Senate, District Q
The Honorable Gary Stevens, Senator, Alaska Senate, District R
The Honorable Lyman Hoffman, Senator, Alaska Senate, District S
The Honorable Donald Olson, Senator, Alaska Senate, District T

State House of Representatives

The Honorable Kyle Johansen, Representative, Alaska House of Representatives, District 1
The Honorable Peggy Wilson, Representative, Alaska House of Representatives, District 2
The Honorable Beth Kerttula, Representative, Alaska House of Representatives, District 3
The Honorable Cathy Munoz, Representative, Alaska House of Representatives, District 4
The Honorable Bill Thomas, Representative, Alaska House of Representatives, District 5
The Honorable Alan Dick, Representative-Elect, Alaska House of Representatives, District 6
The Honorable Woody Salmon, Representative, Alaska House of Representatives, District 6
The Honorable Mike Kelly, Representative, Alaska House of Representatives, District 7
The Honorable Bob Miller, Representative-Elect, Alaska House of Representatives, District 7
The Honorable David Guttenberg, Representative, Alaska House of Representatives, District 8
The Honorable Scott Kawasaki, Representative, Alaska House of Representatives, District 9
The Honorable Jay Ramras, Representative, Alaska House of Representatives, District 10
The Honorable Steve Thompson, Representative-Elect, Alaska House of Representatives, District 10
The Honorable Tammie Wilson, Representative, Alaska House of Representatives, District 11
The Honorable Eric Feige, Representative-Elect, Alaska House of Representatives, District 12
The Honorable John Harris, Representative, Alaska House of Representatives, District 12
The Honorable Carl Gatto, Representative, Alaska House of Representatives, District 13
The Honorable Wes Keller, Representative, Alaska House of Representatives, District 14
The Honorable Mark Newman, Representative, Alaska House of Representatives, District 15
The Honorable Bill Stoltze, Representative, Alaska House of Representatives, District 16
The Honorable Anna Fairclough, Representative, Alaska House of Representatives, District 17
The Honorable Dan Saddler, Representative-Elect, Alaska House of Representatives, District 18
The Honorable Pete Peterson, Representative, Alaska House of Representatives, District 19
The Honorable Max Gruenberg, Representative, Alaska House of Representatives, District 20
The Honorable Harry Crawford, Representative, Alaska House of Representatives, District 21
The Honorable Lance Pruitt, Representative-Elect, Alaska House of Representatives, District 21
The Honorable Sharon Cissna, Representative, Alaska House of Representatives, District 22
The Honorable Les Gara, Representative, Alaska House of Representatives, District 23
The Honorable Berta Gardner, Representative, Alaska House of Representatives, District 24
The Honorable Mike Doogan, Representative, Alaska House of Representatives, District 25
The Honorable Lindsey Holmes, Representative, Alaska House of Representatives, District 26
The Honorable Bob Buch, Representative, Alaska House of Representatives, District 27
The Honorable Mia Costello, Representative-Elect, Alaska House of Representatives, District 27
The Honorable Craig Johnson, Representative, Alaska House of Representatives, District 28
The Honorable Chris Tuck, Representative, Alaska House of Representatives, District 29
The Honorable Charisse Millett, Representative, Alaska House of Representatives, District 30
The Honorable Bob Lynn, Representative, Alaska House of Representatives, District 31
The Honorable Mike Hawker, Representative, Alaska House of Representatives, District 32
The Honorable Kurt Olson, Representative, Alaska House of Representatives, District 33
The Honorable Mike Chenault, Representative, Alaska House of Representatives, District 34
The Honorable Paul Seaton, Representative, Alaska House of Representatives, District 35
The Honorable Alan Austerman, Representative, Alaska House of Representatives, District 36
The Honorable Bryce Edgmon, Representative, Alaska House of Representatives, District 37
The Honorable Bob Herron, Representative, Alaska House of Representatives, District 38
The Honorable Neal Foster, Representative, Alaska House of Representatives, District 39
The Honorable Reggie Joule, Representative, Alaska House of Representatives, District 40

Local Government

Mayors

The Honorable Mary Leith-Dowling, Mayor, City of Delta Junction
The Honorable Bo Fay, Mayor, City of Eagle
The Honorable Jerry Cleworth, Mayor, City of Fairbanks
The Honorable Twila Strom, Mayor, City of Fort Yukon
The Honorable Russ Sweetsir, Mayor, City of Galena
The Honorable Dustin Parker, Mayor, City of McGrath
The Honorable Jason Mayrand, Mayor, City of Nenana
The Honorable Denise Michels, Mayor, City of Nome
The Honorable Doug Isaacson, Mayor, City of North Pole
The Honorable Delena Johnson, Mayor, City of Palmer
The Honorable David Cobb, Mayor, City of Valdez
The Honorable Verne Rupright, Mayor, City of Wasilla

Boroughs

The Honorable David Talerico, Mayor, Denali Borough
The Honorable Luke Hopkins, Mayor, Fairbanks North Star Borough
The Honorable Ron Arvin, Mayor, Matanuska-Susitna Borough
The Honorable Dan Sullivan, Mayor, Municipality of Anchorage

A.2.4 IICEP Letter—Section 106 Letter and Distribution List

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

December 10, 2010

Lieutenant General Dana T. Atkins
Headquarters Alaskan Command
9480 Pease Avenue
JBER, Alaska 99506

Dear Interested Party:

The U.S. Army and U.S. Air Force, on behalf of Alaskan Command (ALCOM), are jointly issuing this letter to advise government agencies, representatives, and the public of their intent to prepare an environmental impact statement (EIS) evaluating the potential environmental consequences associated with modernizing and enhancing current military ground and air training assets in Alaska.

In accordance with the U.S. Department of Defense (DoD) Directive 1322.18, *Military Training*, and Commander U.S. Pacific Command (PACOM), Joint Training Program of Excellence, ALCOM, as DoD's regional joint headquarters in Alaska, has coordinated with the Services to develop a joint strategy to identify joint training opportunities in Alaska, maximize the utilization of training resources, and improve joint training. The *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska (JPARC Modernization and Enhancement EIS)* will evaluate the elements of this strategy that are reasonably foreseeable.

At present, the Joint Pacific Alaska Range Complex (JPARC) consists of all land, air, and sea training areas used by the Army, Navy, and Air Force in Alaska. The military uses the JPARC to conduct testing and training and to support joint exercises and mission rehearsals. The JPARC was originally developed to support cold war weapons, tactics, and techniques. Its current configuration cannot fully meet the training requirement for forces and exercises located in Alaska. The proposed JPARC enhancements would enable realistic joint training and testing to support emerging technologies, respond to recent battlefield experiences, and train with tactics and new weapons systems to meet combat and national security needs. JPARC enhancements would enable the Services to train realistically and jointly so military personnel could succeed in their mutually supportive combat roles when exposed to situations faced in actual combat.

December 10, 2010
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The proposal would modernize existing military training and testing capabilities located in the interior of Alaska through expanding and/or establishing new Military Operations Areas, restricted airspace, and airspace corridors; expanding access to training areas; and developing new ranges and facilities to provide adequate resources to conduct training. The EIS will analyze the environmental effects of the proposed changes and their alternatives. Projects currently proposed to be addressed in the *JPARC Modernization and Enhancement EIS* are presented in Attachment 1. The EIS will address environmental consequences to airspace, noise, safety, biological resources, socioeconomics, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice and risks to children, subsistence, and cumulative impacts. Public and agency scoping may identify other environmental resources for consideration in the EIS.

Pursuant to Title 36 of the *Code of Federal Regulations*, Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f), we would appreciate any assistance you could provide in identifying and retrieving this important information, as well as concerns you may have about the potential effects of the proposal on significant cultural resources in the potentially affected areas. Please send this information to our representative at: SAIC, Attn: Lorraine Gross, 405 S. 8th Street, Suite 301, Boise, ID 83702. We would appreciate your identifying a point of contact for any follow-up questions we may have. Please provide your agency comments or information regarding the proposed initiative no later than February 4, 2011, to be incorporated in the preparation of the draft EIS.

ALCOM will coordinate government-to-government consultation with federally recognized tribes, following DoD policy. The Army and Air Force will invite the Bureau of Land Management, Environmental Protection Agency, Federal Aviation Administration, National Marine Fisheries Service, National Park Service, and Fish and Wildlife Service to be cooperating agencies in preparing the EIS. All cooperating and other interested government agencies are invited to attend either an Anchorage or a Fairbanks Agency Meeting at the times and locations listed below. The meetings are being held to provide clarity on the JPARC proposed actions, collect information, learn about agency concerns, and invite questions. Both meetings will begin with a half-hour open house and then proceed to a question and answer session prior to lunch. In the afternoon, the open house will resume and subject matter experts will be available to discuss specific technical topics.

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As an additional effort to inform the public of these meetings, we request your assistance in posting the enclosed flyer in a visible place within your community. The scoping meetings will be in an open house format, in which military representatives will (1) describe the proposed action and alternatives, (2) explain the National Environmental Policy Act, (3) outline opportunities for public involvement, and (4) answer questions about the proposal.

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Sincerely,

DANA T. ATKINS
Lieutenant General, USAF
Commander

3 Enclosures:

1. JPARC Proposed Activities and Maps
2. Scoping Meeting Location Flyer
3. Distribution List

IICEP Letter – Section 106 Distribution List

Judith Bittner, Chief, Alaska Department of History and Archaeology

A.2.5 IICEP Letter—Endangered Species Act Letter and Distribution List

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

December 10, 2010

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Headquarters Alaskan Command
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To support compliance with the Endangered Species Act and informal Section 7 consultation, we would like to request information regarding federally listed threatened, endangered, and candidate species, as well as species that are proposed to be listed, that occur or may occur in the potentially affected area. Please send this information to our representative at: SAIC, Attn: Tom Mulroy, 5464 Carpinteria Avenue, Suite K, Carpinteria, CA 93013. We would appreciate your identifying a point of contact for any follow-up questions we may have. Please provide your agency comments or information regarding the proposed initiative no later than February 4, 2011, to be incorporated in the preparation of the draft EIS.

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Lieutenant General, USAF
Commander

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IICEP Letter – Endangered Species Act Distribution List

Federal Government

Geoffrey Haskett, Regional Director, US Fish and Wildlife Service

State Government

Doug Larsen, Director, Alaska Department of Fish and Game, Division of Wildlife Conservation
David Bedford, Deputy Commissioner, Alaska Department of Fish and Game

A.2.6 Scoping Meeting General Public Letter and Distribution List

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

December 10, 2010

Lieutenant General Dana T. Atkins
Headquarters Alaskan Command
9480 Pease Avenue
JBER, Alaska 99506

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Sincerely,

DANA T. ATKINS
Lieutenant General, USAF
Commander

3 Enclosures:

1. JPARC Proposed Activities and Maps
2. Scoping Meeting Location Flyer
3. Distribution List

General Public Distribution List

Organizations

John MacKinnon, Executive Director, AGC of Alaska
Bruce Cain, Operations Advisor, Ahtna Corporation
Ken Johns, President and CEO, Ahtna Inc.
Matt Wallace, Executive Director, AKPirg
Lieutenant General Tom Case, President and COO, Alaska Aerospace Corporation
Dale Nash, CEO, Alaska Aerospace Corporation
Vince Beltrami, Executive President, Alaska AFL-CIO
Steve Baker, Alaska Manager, Alaska Airlines
Cory Christian, Station Manager, Alaska Airlines
Art Clark, President and CEO, Alaska Association of Realtors
Toby Smith, Executive Director, Alaska Center for the Environment
Pamela Miller, Executive Director, Alaska Community Action on Toxics
Caitlin Higgins, Executive Director, Alaska Conservation Alliance
Nick Hardigg, Executive Director, Alaska Conservation Foundation
Nelson Angapak, Executive Vice President, Alaska Federation of Natives
Brad Garness, Executive Director, Alaska Inter-Tribal Council
Dorothy Childers, Executive Director, Alaska Marine Conservation Council
Steve Borrell, Executive Director, Alaska Miners Association
Kathie Wasserman, Executive Director, Alaska Municipal League
Dr. Don Bantz, President, Alaska Pacific University
Robert Grimm, President and CEO, Alaska Power and Telephone
Marilyn Leland, President and CEO, Alaska Power Association
Susan Olsen, President, Alaska Quiet Rights Coalition
Christopher Aadnesen, President, Alaska Railroad Corporation
Tom Brook, Vice President Engineering and Chief Engineer, Alaska Railroad Corporation
Wendy Lindskoog, Vice President Corporate Affairs, Alaska Railroad Corporation
William O'Leary, Acting President/CEO, Alaska Railroad Corporation
Wayne Stevens, President, Alaska State Chamber of Commerce
Gary Wilken, Former Senator, Alaska State Legislature
Paul Laird, General Manager, Alaska Support Industry Alliance
Aves Thompson, President and CEO, Alaska Trucking Association
Tim Wheeler, President and CEO, Alaska Veterans Business Alliance
John Toppenberg, Director, Alaska Wildlife Alliance
Thomas Barrett, President and CEO, Alyeska Pipeline Service Company
David Wight, Retired President and CEO, Alyeska Pipeline Service Company
Mike Berry, Western District Commander, American Legion, Department of Alaska
Harry Pawson, Commander, American Legion, Department of Alaska
Sami Glascott, President, Anchorage Chamber of Commerce
Julie Saupe, President and CEO, Anchorage Convention and Visitors Bureau
Bill Popp, President and CEO, Anchorage Economic Development Corporation
Mary Hertert, Acting Executive Director, Anchorage Waterways Council
Executive Director, Arctic Network
Rex Rock, President and CEO, Arctic Slope Regional Corp.

Kirk Pickerel, President and CEO, Associated Builders and Contractors
Stephanie Madsen, Executive Director, At-Sea Processors Association
John Schoen, Interim Executive Director, Audubon Society of Alaska
Gale Schubert, President and CEO, Bering Straits Native Corporation
Bob DeLoach, President, Big Lake Chamber of Commerce
Phil Cochrane, External Affairs Manager, BP Exploration Alaska
Jason Metrokin, President and CEO, Bristol Bay Native Corporation
Andrew Guy, President and CEO, Calista Corporation
Robin Jonas, President, Chalkyitsik Native Corporation
John Zager, Alaska Manager, Chevron
Shari Buretta, Board Chair, Chugach Alaska Corporation
Ed Herndon, CEO, Chugach Alaska Corporation
Joe Hegna, President, Chugiak-Eagle River Chamber of Commerce
Joe Beedle, President, Commonwealth North
Trond-Erik Johansen, President and CEO, ConocoPhillips Alaska
Margie Brown, President and CEO, Cook Inlet Region, Inc.
Bob Shavelson, Executive Director, Cook Inletkeeper
Warren Ulrich, President, Copper Valley Chamber of Commerce
Head Librarian, Copper Valley Community Library
Karla Dutton, Program Director, Defenders of Wildlife, Alaska Office
Brenda Peterson, Executive Director, Delta Chamber of Commerce
Head Librarian, Delta Junction Library
Scott Jepsen, President, Denali -- The Alaska Gas Pipeline
Norman Phillips, Jr., President and CEO, Doyon Limited
Eric Jorgensen, Managing Attorney, Earthjustice Legal Defense Fund
Bill Brackin, Alaska Manager, ExxonMobile
Deb Hickok, President, Fairbanks Convention and Visitors Bureau
Rhonda Baker-Joseph, President, Fairbanks Native Association
Jeff Cook, Vice President, Flint Hills Resources
Dominica Quitevis, President, Gana-A' Yoo, Limited (Galena)
Lisa Herbert, Executive Director, Greater Fairbanks Chamber of Commerce
Board of Directors, Greater Healy/Denali Chamber of Commerce
Heidi DeCoeur, President, Greater Healy/Denali Chamber of Commerce
Jillyan Webb, Executive Director, Greater Palmer Chamber of Commerce
Chris Abernathy, President, Greater Wasilla Chamber of Commerce
Executive Director, Greenpeace Alaska
Luci Beach, Executive Director, Gwich'in Steering Committee
President, Gwitchyaa Zhee Corporation (Fort Yukon)
Adelene Galen, President, Hungwitchin Corporation (Eagle)
John Kelsey, Co-Partner, Manager, International Management Group
Jennifer John, President, Lime Village Company
Sandi Culver, Interim CEO and CFO, MTNT Limited (McGrath)
Helvi Sandvik, President, NANA Development Corporation, Inc.
Marie Greene, President and CEO, NANA Regional Corporation
Jim Stratton, Senior Regional Director, National Parks and Conservation Association
President, Nenana Valley Chamber of Commerce
Rick Nerland, President, Nerland Agency

Betsy Bear, President, North Pole Community Chamber of Commerce
Karen Max Kelly, Executive Director, Northern Alaska Environmental Center
Diane Pederson, Editor, Pathfinder -- Pioneers of Alaska
Carl Portman, Deputy Director, Resource Development Council for Alaska, Inc.
Jason Brune, President, Resource Development Council for Alaska, Inc.
James Collins, President, Retired Military Officers Association/Alaska
Ryan Binkley, President, Riverboat Discovery
Bill Robertson, Executive Secretary, Rotary Club of Fairbanks
Chris McNeil, President and CEO, Sealaska Corporation
Cam Toohey, Vice President, Shell Exploration and Production
Pam Brody, Board Chair, Sierra Club Alaska
Michael Catsi, Executive Director, Southwest Alaska Municipal Conference
Trisha Costello, President, Talkeetna Chamber of Commerce
Head Librarian, Talkeetna Public Library
Jerry Isaac, President, Tanana Chiefs Conference
Rick Boyles, Executive President, Teamsters
David Gillespie, CEO, The Aleut Corporation
Richard Romer, Alaska Manager, The Boeing Company
Randy Hagenstein, Alaska State Director, The Nature Conservancy
John Shively, CEO, The Pebble Partnership
Nicole Whittington-Evans, Acting Regional Director, The Wilderness Society
Howard Golden, President, The Wildlife Society, Alaska Chapter
Executive Director, Tok Chamber of Commerce
Head Librarian, Tri-Valley Community Library
Trish Rolfe, Executive Director, Trustees for Alaska
Larry Cooper, President, Ukpeagvik Inupiat Corporation
Renee Sinclair, Regional Director, United States Chamber of Commerce
Pat Gamble, President, University of Alaska
Gary Selk, Professor, University of Alaska Anchorage
Fran Ulmer, Chancellor, University of Alaska Anchorage
Jake Poole, Vice Chancellor, University of Alaska Fairbanks
Nirenda Biswas, Professor Emeritus, University of Alaska Fairbanks, Department of Seismology
Delta Junction Postmaster, US Postal Service
Glennallen Postmaster, US Postal Service
Healy Postmaster, US Postal Service
Talkeetna Postmaster, US Postal Service
Bill Brophy, President, Usibelli Coal Mine, Inc.
Thomas Tradewell, Commander, Veterans of Foreign Wars, Department Alaska
Ric Davidge, President, Vietnam Veterans of America, Alaska State Council
Tony Turrini, Alaska Director, Wildlife Federation of Alaska

Individuals

Stosh Hoffman Jr., Board Member, Alaska Board of Game
President, Alaska Frontier Trappers Association
Paul Brown, North Pole Chamber of Commerce, AMFAST Representative
Lyn Carden, Wasilla Chamber of Commerce, AMFAST Representative

Jim Dodson, President, Dodson Development, AMFAST Representative
John Duffy, Mat-Su Borough, AMFAST Representative
Sheila Finkenbinder, Sitka Chamber of Commerce, AMFAST Representative
Robert Lachowski, Kodiak Chamber of Commerce, AMFAST Representative
Loren Lounsbury, AMFAST Representative
Martin Maricle, Alaska Department of Natural Resources, AMFAST Representative
Peter Mulcahy, Chugiak/Eagle River Chamber of Commerce, AMFAST Representative
Mary Kay Ryckman, Alaska Department of Natural Resources, AMFAST Representative
Lena Simmons, Alaska Office of Management and Budget, AMFAST Representative
George Vakalis, Municipality of Anchorage, AMFAST Representative
Jack Wilber, Alaska State Chamber of Commerce, AMFAST Representative
Kenneth Lythgoe, Non-Airline Tenant Representative, Aviation Advisory Board
Judy McKenzie, All-Cargo Air Carrier Seat, Lynden Air Cargo, LLC, Aviation Advisory Board
Frank Neitz, Unorganized Borough Representative, Aviation Advisory Board
Tom Nicolos, Public Representative, Aviation Advisory Board
Alberto Orot, Alaska International Airport System Operating Agreement Signatory, Aviation Advisory Board
Lee Ryan, Representing 2nd Judicial District, Arctic Transportation Services, Aviation Advisory Board
Michael Salazar, Alaska Air Carriers Association Representative, Aviation Advisory Board
James Stedman, Regional Air Carrier Representative, Aviation Advisory Board
Steven Strait, Mayor of the Municipality of Anchorage Representative, Aviation Advisory Board
Sharon Anderson, President, Anderson Business Consulting, Citizen Advisory Board
Barbara Andrews-Mee, Citizen Advisory Board
John Binkley, Director, Alaska Cruise Association, Citizen Advisory Board
William Bittner, Attorney-at-Law, Birch Horton Bittner and Cherot, Citizen Advisory Board
Carl Brady, Jr., Chairman and CEO, Brady & Co. , Citizen Advisory Board
Al Bramstedt, Consultant, KTUU-TV, Citizen Advisory Board
William Brooks, President, Arctic Bee Construction, Citizen Advisory Board
Dr. Leo Bustad, Cardiologist, Alaska Heart Institute, Citizen Advisory Board
Dan Cuddy, President and Chairman, First National Bank Alaska, Citizen Advisory Board
Frank Danner, President, Far North Fisherman, Inc. , Citizen Advisory Board
Perry Eaton, President, Eaton Consulting, Citizen Advisory Board
Al Fleetwood, President, Fleetwood & Associates Consulting, Citizen Advisory Board
Dan Gavora, President, Doyon Utilities, Citizen Advisory Board
George Gordon, Retired President, Doyon Utilities, Citizen Advisory Board
Ernie Hall, President, Alaska Furniture Manufacturers, Inc. , Citizen Advisory Board
Bob Hickel, Owner/Director, Hickel Investment Co. , Citizen Advisory Board
Tim Hurley, Owner, Western Alaska Land Title Company, Citizen Advisory Board
The Honorable Karl Johnstone, Retired Superior Court Judge, Citizen Advisory Board
Julie Kitka, President and CEO, Alaska Federation of Natives, Citizen Advisory Board
Janie Leask, President and CEO, First Alaskans Institute, Citizen Advisory Board
Jake Lestenkof, Trust Administrator, Aleutian/Pribilof Trust, Citizen Advisory Board
Steve Lundgren, Executive Vice President, Denali State Bank, Citizen Advisory Board
Carl Marrs, President, Marrs & Co. , Citizen Advisory Board
Dr. David McGuire, Orthopaedic Surgeon, Alaska Orthopaedic Specialists, Citizen Advisory Board

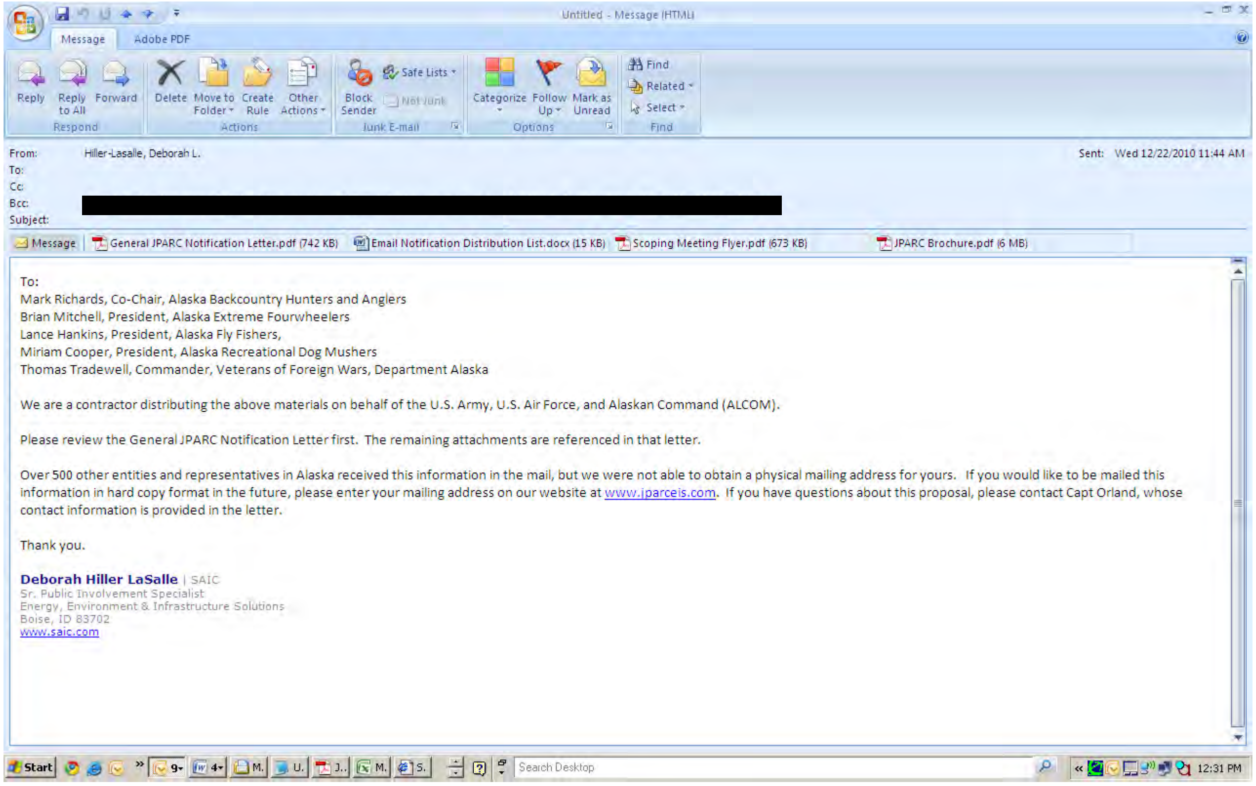
Rick Morrison, President, Morrison Auto Group, Citizen Advisory Board
Gloria O'Neill, President and CEO, Cook Inlet Tribal Council, Citizen Advisory Board
Tennys Owens, President, Artique Ltd. , Citizen Advisory Board
Terry Parks, Owner, Alaska ACES, Citizen Advisory Board
Liane Pelletier, President and CEO, Alaska Communications Systems (ACS) , Citizen Advisory Board
Bob Penney, Owner, Penco Properties/Kenai River Sportfishing Association; Citizen Advisory Board
Ed Rasmuson, Board Chairman, Rasumson Foundation, Citizen Advisory Board
Marilyn Romano, Publisher, Fairbanks Daily News-Miner, Citizen Advisory Board
Tom Sweeney, President, Sweeney Insurance, Inc. , Citizen Advisory Board
Dr. Robert Taylor, Retired Urologist, Citizen Advisory Board
Chick Wallace, Owner, Wallace, Wallace and Wakefield Realtors, Citizen Advisory Board
Richard Wien, Member, Governor's Aviation Advisory Council

User Groups

Leif Wilson, President, 40 Mile Air
Tom George, Regional Representative, Aircraft Owners and Pilots Association
Joy Journeay, Executive Director, Alaska Air Carriers Association
Dee Hanson, Executive Director, Alaska Airmen's Association
Adam White, President, Alaska Airmen's Association
President, Alaska ATV Club
Manager, Alaska Backcountry Adventure Tours
Mark Richards, Co-Chair, Alaska Backcountry Hunters and Anglers
Anne Ruggles, Executive Director, Alaska Bird Observatory
Jack Frost, Legislative Vice President, Alaska Bowhunters Association
Shannon Erhart, President, Alaska Dog Mushers Association
Brian Mitchell, President, Alaska Extreme Fourwheelers
Mike Schultz, President, Alaska Farm Bureau
Executive Director, Alaska Fishing Club
Lance Hankins, President, Alaska Fly Fishers
Owen Graham, President and CEO, Alaska Forest Association
Paul Maki, President, Alaska Interior Marksmanship Committee
Pete Haggland, ACMAC member, Alaska Miners Association
Gary Olson, Chairman, Alaska Moose Federation
Wayne Devore, President, Alaska Motor Musher's Club
Scott Halla, President, Alaska Outdoor Access Alliance
Rod Arno, Executive Director, Alaska Outdoor Council
Robert Fithian, Executive Director, Alaska Professional Hunters Association
Miriam Cooper, President, Alaska Recreational Dog Mushers
Jamie Marschner, President, Alaska SkiJor and Pulk Association
Steve Wilhelmi, Editor, Alaska Snowrider
Max Gruner, Executive Director, Alaska Trails
Randy Zarnke, President, Alaska Trappers Association
Ron Peck, President and CEO, Alaska Travel Industry Association
Executive Director, Alaska Volunteer Hunter Education Instructor's Association

Hanna Waterstrat, Executive Director, Alaska Wilderness Recreation and Tourism Association
Colonel Carl Brown, Commander, Alaska Wing, Civil Air Patrol
Carl Siebe, Chairman, Alaskan Aviation Safety Foundation
John Rasmussen, President, Alaskan Sled Dog and Racing Association
Allen Freudenthal, President, Anchorage Skijor Club
Gary Brown, President, Anchorage Snowmobile Club
Wilfred Ryan, President, Arctic Transportation Services
Larisa Myers-McCoin, President, Aurora Dog Mushers Association
Brendan McCormack, Aviation Safety Specialist, ConocoPhillips Alaska, Aviation Safety Council of Alaska
Alden Mowry, Chief Pilot, Bush Airventures, Inc.
Executive Director, Chitina Dipnetters Association
Executive Director, Cook Inlet Archers
Executive Director, Delta Sportsman's Association
Executive Director, Deshka Landing Outdoor Association
Ben Soiseth, Alaska State Chair, Ducks Unlimited
Dave Weber, Alaska Regional Director, Ducks Unlimited
Robert Everts, President, Everts Air
Dick Reeve, President, Experimental Aircraft Association, Alaska Chapter
Corrie Elmes, President, Fairbanks Retriever Club
Executive Director, Fairbanks Snow Travelers Association
Executive Director, Foundation for North American Wild Sheep, Alaska Chapter
Roxie Creamer, President, Friends of Creamer's Field
David Fagre, Chief Pilot, Frontier Flying Service, Inc.
Jim Strickland, Assistant Chief Pilot, Frontier Flying Service, Inc.
Stan Hooley, Executive Director, Iditarod Trail Committee
Betty Redfern, Executive Director, Interior Alaska Airboat Association
President, Interior Alaska Trail Riders Association
President, Matanuska Valley Sportsman's Range Club
Dennis Ward, Executive Director, Medallion Foundation
Ed Bolen, President and CEO, National Business Aviation Association
Ron Duncan, Director, National Business Aviation Association
Brad Kruger, Field Representative, National Rifle Association
Bryan Carricaburu, Chief Pilot, Pen Air
Richard Harding, Senior Vice President, Pen Air
Ken Larimore, President, Ruffed Grouse Society, Interior Alaska Chapter
Terry Holliday, President, Safari Club International, Alaska Chapter
John Pratt, Field Director, Seaplane Pilots Association
Grant Lewis, President, Tanana Valley Sportsmen's Association
Nelli Williams, Alaska Council Chair, Trout Unlimited
Lynn Orbison, President, Two Rivers Dog Mushers Association
Mark Vinsel, Executive Director, United Fisherman of Alaska
Arthur Warbelow, Jr., President, Warbelow's Air Ventures
Erin McLarnon, President, Willow Dog Mushers Association
Chris Matthews, President, Wright Air Service

A.2.7 Scoping Meeting General Public Email Notification and Distribution List



Untitled - Message (HTML)

From: Hiller-Lasalle, Deborah L.

Sent: Wed 12/22/2010 11:44 AM

To:

Cc:

Bcc: [redacted]

Subject:

Message | General JPARC Notification Letter.pdf (742 KB) | Email Notification Distribution List.docx (15 KB) | Scoping Meeting Flyer.pdf (673 KB) | JPARC Brochure.pdf (6 MB)

To:
Mark Richards, Co-Chair, Alaska Backcountry Hunters and Anglers
Brian Mitchell, President, Alaska Extreme Fourwheelers
Lance Hankins, President, Alaska Fly Fishers,
Miriam Cooper, President, Alaska Recreational Dog Mushers
Thomas Tradewell, Commander, Veterans of Foreign Wars, Department Alaska

We are a contractor distributing the above materials on behalf of the U.S. Army, U.S. Air Force, and Alaskan Command (ALCOM).

Please review the General JPARC Notification Letter first. The remaining attachments are referenced in that letter.

Over 500 other entities and representatives in Alaska received this information in the mail, but we were not able to obtain a physical mailing address for yours. If you would like to be mailed this information in hard copy format in the future, please enter your mailing address on our website at www.jparceis.com. If you have questions about this proposal, please contact Capt Orland, whose contact information is provided in the letter.

Thank you.

Deborah Hiller LaSalle | SAIC
Sr. Public Involvement Specialist
Energy, Environment & Infrastructure Solutions
Boise, ID 83702
www.saic.com

General Public Email Distribution List

Mark Richards, Co-Chair, Alaska Backcountry Hunters and Anglers
Brian Mitchell, President, Alaska Extreme Fourwheelers
Lance Hankins, President, Alaska Fly Fishers
Miriam Cooper, President, Alaska Recreational Dog Mushers
Thomas Tradewell, Commander, Veterans of Foreign Wars, Department Alaska

A.3 SUMMARY OF SCOPING MEETINGS AND SCOPING COMMENTS

The scoping period for the *JPARC Modernization and Enhancement EIS* extended from December 8, 2010 to March 4, 2011. During the scoping period, the Air Force and Army held formal public scoping meetings and meetings with community leaders and government agencies and representatives. These meetings and engagements are described below. The Air Force and Army recorded community issues and concerns raised during the meetings and also invited written comments. In addition to the meetings, the Air Force and Army invited public and agency comment through the *Federal Register* Notice of Intent (Section A.1); IICEP, Scoping, (Sections A.2 – A.3) and Consultation letters (Appendix L); display advertisements in six local newspapers: *Anchorage Daily News, Alaska Star, Copper River Record, Fairbanks Daily News-Miner, Delta Wind, and The Frontiersman*; and through an interactive website, press releases, public service announcements, and posted fliers. Section A.3.2 summarizes the scoping issues and concerns captured from the meetings discussed below and the written comments.

A.3.1 Summary of Public Scoping Meetings, Meetings with Community Leaders, Agency Meetings, and Other Engagements

A.3.1.1 Public Scoping Meetings

The Air Force and Army held seven scoping meetings to gather community-specific issues and concerns to be used as important indicators in guiding the environmental impact statement (EIS) analysis. Scoping meetings were held from 6:30 to 8:30 p.m., except in Fairbanks, where meetings were held from noon to 2:00 p.m. and from 4:00 to 8:00 p.m. Meeting attendees were asked to sign in, and Air Force and Army resource specialists were on hand to provide information and to answer questions on each proposed action and the associated alternatives. A total of 14 full-color posters exhibiting the proposed actions and alternatives were available for review at each scoping meeting. Comment forms were available for participants to provide written comments.

Colonel Gregory Bell began by summarizing the purpose of the scoping meetings and introduced subject matter experts familiar with each Joint Pacific Alaska Range Complex (JPARC) proposal, the alternatives, and the National Environmental Policy Act (NEPA) process. The introduction was followed by an 8-minute video. The video provided information to the public about JPARC and the importance of its mission to the success of the U.S. military and national security. Table A-1 shows the meeting dates and locations, number of meeting attendees, and number of written comments received.

Table A-1. Scoping Meeting Dates and Locations

Date/Time	Location	Number of Attendees Checking in at Sign-in Table	Number of Written Comments Submitted
January 13, 2011 6:30 to 8:30 p.m.	Millennium Alaskan Hotel Turnagain Room 4800 Spenard Road Anchorage, AK 99517-3236	34	1
January 18, 2011 6:30 to 8:30 p.m.	Caribou Hotel Mile 186.5 Glenn Highway Glennallen, AK 99588	33	3
January 19, 2011 6:30 to 8:30 p.m.	Alaska Steakhouse and Motel 1271 Richardson Highway, Mile 265 Delta Junction, AK 99731	29	1
January 20, 2011 noon to 2:00 p.m. and 4:00 to 8:00 p.m.	Princess Fairbanks Hotel 4477 Pike's Landing Fairbanks, AK 99709	114	3
January 24, 2011 6:30 to 8:30 p.m.	Motel Nord Haven 249 George Parks Highway Healy, AK 99743	29	0
January 25, 2011 6:30 to 8:30 p.m.	Swiss Alaska Inn 22056 South F Street Talkeetna, AK 99676	28	2
January 26, 2011 6:30 to 8:30 p.m.	Menard Memorial Sports Center 1001 South Mack Drive Wasilla, AK 99654	85	6
Totals		**352**	**16**

After the scoping meetings closed, the Scoping Team met to debrief and recorded the number of people who attended the meeting; any Federal, state, or local representatives in attendance; media interactions; and issues raised and discussed.

A.3.1.2 Meetings with Community Leaders

In addition to the scoping meetings, Air Force and Army leadership held briefings in Glennallen, Delta Junction, Healy, and Wasilla with local community leaders. Table A-2lists the date and location of each meeting, as well as attendees.

Table A-2. Community Briefing Dates, Locations, and Attendees

Date/Location	Attendees
January 18, 2011 Glennallen	Kathryn Martin, Ahtna Vice President of Land and Resources; Joe Bovee, Ahtna Land Manager; Bruce Cain, Ahtna Operations Advisor
January 19, 2011 Delta Junction	Mary Leith-Dowling, Delta Junction Mayor; Mike Tvenge, Delta Junction City Administrator; Pete Hallgren, Delta Junction Mayor Pro Tem
January 24, 2011 Healy	Gale Pieknik, Healy City Clerk, and Robert Kohlsdorf, Healy City Council Presiding Officer
January 26, 2011 Wasilla	Verne Rupright, Wasilla Mayor; Marvin Yoder, Wasilla Deputy Administrator; James Hastings, Menard Sports Center Director

A.3.1.3 Agency Meetings

Air Force and Army leadership met with government agencies having jurisdiction over lands or resources potentially impacted by JPARC on January 14, 2011, in Anchorage and on January 21, 2011, in Fairbanks. The meetings were held in a format similar to the scoping meetings. The goal of these meetings was to provide clarity on the JPARC proposed actions and to request early coordination, resource information, concerns, and questions. Table A-3 lists the meeting date, location, and government representatives attending.

Table A-3. Agency Meeting Dates and Locations

Date/Time	Location	Attendees
January 14, 2011 10:00 a.m. to noon and 1:00 to 5:00 p.m.	Millennium Alaskan Hotel Turnagain Room 4800 Spenard Road Anchorage, AK 99517-3236	• Greg Howard, Federal Aviation Administration (FAA) • Derril Bergt, FAA • Melanie Hunter, Bureau of Land Management (BLM) • David Chilson, FAA • Brandon McCutcheon, Alaska Department of Natural Resources (ADNR) • Bob Lewis, FAA Regional Administrator
January 21, 2011 10:00 a.m. to noon and 1:00 to 5:00 p.m.	Princess Fairbanks Hotel 4477 Pike's Landing Fairbanks, AK 99709	• Sissy Steins, FAA, National Air Traffic Controllers Association • Skip Theisen, BLM • Don Schrader, FAA, Fairbanks International Airport, Air Traffic Manager • Mary Lynch, BLM, Alaska Fire Service • Wes Stark, BLM, Alaska Fire Service • Jeanne Proulx, ADNR • William Rice, Eielson Air Force Base • Curtis Harper, FAA, Fairbanks International Airport, Air Traffic Control Tower • Mayor Doug Isaacson, North Pole • Tami DeFries, BLM, Alaska Fire Service • John Sofrich, BLM • Jewel Bennett, U.S. Fish and Wildlife Service • Christy Everett, U.S. Army Corps of Engineers (USACE), Regulatory Branch • Melissa Osborn, Alaska Department of Transportation and Public Facilities, Fairbanks International Airport • Ellen Lyons, USACE, Regulatory Branch

A.3.1.4 Other Engagements

In addition to the scoping meetings, meetings with community leaders, and agency meetings, Alaskan Command (ALCOM) also met with several other entities to introduce and discuss the JPARC proposal. Table A-4 lists the dates and engagements.

Table A-4. Other Engagements

Date	Engagement
February 4, 2011	Alaska Military Force Advocacy Structure Team meeting with The Adjutant General – Alaska (TAG-AK)
February 8, 2011	Joint Armed Services Committee briefing in Juneau
February 10, 2011	Senator Begich's staffers, discussion on JPARC EIS proposals
February 11, 2011	Telephone conference with Senator Murkowski's staffers regarding JPARC EIS proposals
February 15, 2011	Matanuska-Susitna Valley assembly meeting
February 16, 2011	Congressman Young's staffers, discussion on JPARC EIS proposals
February 28, 2011	Formal Government-to-Government Consultation with Federally Recognized Tribes Regarding JPARC EIS proposals

A.3.2 Synopsis of Public Comments

The tables and graphs below summarize the public comments provided to ALCOM, the Air Force, and the Army during the public scoping period. These comments, verbal and written, were generated via the website for the *JPARC Modernization and Enhancement EIS*; by regular mail, email, phone, and fax; and at the public scoping meetings described in Section A.3.1.

Overall, agencies, government representatives, nongovernment organizations, citizens, and Native Alaskans submitted 770 website comments, letters, emails, phone comments, and faxes to ALCOM. In those 770 comments, commenters expressed more than 2,000 concerns. Table A-5 summarizes key issues identified in the 770 comments, sorted by environmental resource area. Development of this comment summary began with a review of each comment for content. Key issues were identified and the comments categorized by EIS resource area topic (e.g., airspace management and use, biological, cultural). Additionally, each comment was categorized as either pertaining to all of the proposed actions or to specific actions proposed in the EIS, as shown in the right-hand column of the table.

The actions and topics of greatest concern include the expansions of the Fox and Paxon Military Operations Areas (MOAs), the lowering of the Fox 3 MOA to 500 feet, and related impacts on civil aviation, residents, recreation, hunting, wildlife (particularly caribou/moose migration and calving areas and trumpeter swan/migratory bird breeding grounds), subsistence activities, the tourism industry, and commercial aviation access. Specific areas of concern include Fairbanks International Airport access and the areas of Lake Louise, Copper Basin, the Talkeetna Mountains, and the Denali Highway corridor. Safety concerns mainly focused on airspace conflicts below 5,000 feet above ground level (AGL), particularly the mix of high-speed aircraft with low-speed small aircraft. Hazardous waste concerns mainly centered on the history and future potential of unexploded ordnance closing off access to public lands.

Commenters were particularly concerned about airspace proposed over the Battle Area Complex (BAX) and the impacts to air traffic in Isabel Pass. Several commenters expressed concern overall that these proposals negatively impacted the highly populated, highly used, road-accessible Alaskan beltway. Socioeconomic concerns related to the tourism, mining, and guiding industries. Several commenters requested that training exercises avoid the summer and fall season due to the high tourism traffic during those times of year. Other major concerns related to impacts on personal freedoms and Alaskan values of solitude, peace, and quiet and utilizing nature for recreation as well as subsistence.

Table A-6 lists the approximate number of comments received for each proposed action and EIS resource area or topic. These numbers were generated by tallying the approximate number of times a concern was mentioned.

Many comments received by the military concerned more than one proposed action and more than one resource area. Such comments were categorized in all relevant actions/topics to ensure their full consideration during EIS preparation. For example, any expressed concern about aircraft conflicts or crashes in the Fox 3 MOAs and other areas was assigned to two proposed action categories, "General" and "Fox 3 MOA Expansion," and two environmental resource topic areas, "Airspace Management and Use" and "Health, Safety and Security." Accordingly, the number of issues expressed (over 2,000) is greater than the number of comments received during the scoping period (770).

Figure A-1 displays the areas and locations referred to in a representative sample of the comments. The map depicts commenters having most concerns in the Summit Lake, Paxson, Susitna Lake, and Lake Louise areas. Table A-7 lists the areas described in the comments received, along with map ID numbers and reference locations to use when viewing Figure A-1.

Table A-5. Key Issues by Resource Area

Issue	Relevant Proposed Actions
Airspace Management and Use	
Because aviation is the essential means of access to rural Alaska given the expansive geography and very limited surface transportation, the consequences from loss of access for civilian aviation (and dependent activities, businesses, and communities) can be great. The following aspects of the proposal and effects on access need to be fully evaluated: the altitude structure, particularly lowering the MOA floors to 500 feet AGL (so that civilian and military traffic would share airspace in a visual flight rule environment), lateral expansion of the MOAs and distance to circumnavigate.	Fox 3/Paxon MOA BAX RA Expand R-2205 RA NJT UAV Access
The effect of converting MOA to restricted airspace which precludes civilian use needs to be fully evaluated in terms of hours lost to circumnavigate, or lost access to airstrips serving areas under proposed restricted airspace.	RLOD BAX RA Expand R-2205 RA UAV Access
Potential disruption to established routes (Victor routes, RNAV) and impact on commercial air carriers, particularly in the congested airspace around Fairbanks.	Fox 3/Paxon MOA BAX RA Expand R-2205 RA UAV Access
Analysis should identify small landing strips and private airfields affected by the actions, and particularly those providing IFR services for all-weather access.	Fox 3/Paxon MOA BAX RA Expand R-2205 RA UAV Access
Concern that the structure of military airspace would force civilian traffic to operate in MOAs (using “see and avoid”), increasing potential safety risks (mostly in air collision) due to congestion, mix of aircraft types with varying performance levels, and mix of pilot skill levels.	Fox 3/Paxon MOA UAV Access
Existing SUAIS communications system has proved effective at maximizing access using “real-time” notifications and advisories. However, the current system may be inadequate to provide deconfliction and information to pilots for a wider area.	Fox 3/Paxon MOA NJT UAV Access Missile Live-Fire
Many private pilots do not have compatible or adequate communication equipment to receive notifications. This limits the effectiveness of the system and could result in unsafe situations. The analysis should consider what improvements are needed to provide safe airspace management for all users.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2205 RA NJT UAV Access Missile Live-Fire
With cumulative complexity and congestion of airspace in the Fairbanks area (civilian and military), following airspace rules is a public safety concern. The analysis should consider methods to monitor compliance as part of the overall airspace management system.	Fox 3/Paxon MOA BAX RA Expand R-2205 RA NJT UAV Access
UAVs are unable to operate in “see and avoid” environment. Routes/corridors or rules for sharing or dedicating airspace for these vehicles adds complexity to managing airspace for civilian use that is essential for day-to-day functioning in Alaska.	UAV Access
Noise	
Increase in noise levels from proposed military operations, particularly from aircraft operations at low altitudes and at night, potentially causing annoyance and disturbance to persons, domestic animals, wildlife, and other receptors.	Fox 3/Paxon MOA NJT UAV Access
Potential for proposed military operations to cause incompatible noise levels with activities in impacted area, particularly in populated areas.	Fox 3/Paxon MOA NJT UAV Access

Table A-5. Key Issues by Resource Area *(continued)*

Issue	Relevant Proposed Actions
Noise (continued)	
Expansion of areas affected by noise, potentially causing annoyance or change to the quality of characteristically quiet areas, particularly in noise sensitive areas, national parks, wilderness area and Federal and State conservation areas.	Fox 3/Paxon MOA NJT UAV Access Missile Live-Fire
Expansion of areas affected by sonic booms potentially causing damage to homes, persons, domestic animals, wildlife or other receptors	Fox 3/Paxon MOA NJT
Potential increase in impulsive noise from increased munitions use and new types of munitions on recreation and various uses on non-military lands.	RLOD BAX RA Expand R-2205 RA JAGIC
Safety	
Safety-Cumulative	
Potential increase in safety risks from the cumulative increase in land and airspace military use, intensified use of existing areas, live ordnances, extended nighttime training hours, and lowered flight levels.	All proposed actions
Safety-Aircraft/Airspace	
Proposed lowering of the MOA floor and creation of UAV corridors, particularly during bad weather and in areas with limited communication capabilities, where difficulty may exist in identifying UAV corridors with VFR instruments, in narrow corridors, and in areas of high use, increasing potential for low-level aircraft conflicts and crashes.	Fox 3/Paxon MOA UAV Access
Increase in nighttime training potentially causing increased aircraft conflicts and crashes.	NJT
Increase in low-flying aircraft and UAVs potentially increasing ground hazards from aircraft crashes, particularly in high-use recreations area.	Fox 3/Paxon MOA UAV Access
Increase in low-flying aircraft potentially causing health hazards from noise or pollution.	Fox 3/Paxon MOA BAX RA Expand R-2202 RA UAV Access JAGIC
Potential increase in bird/wildlife-aircraft strike hazard (BASH) from increased low-level flights.	Fox 3/Paxon MOA NJT UAV Access Missile Live-Fire
Potential for expanded special use airspace to restrict ability for flight training, essential Medevac access, air access to emergencies or wildfires, the delivery of essential goods in the winter to towns, or state fire suppression efforts.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA UAV Access JAGIC JPADS Missile Live-Fire
Increased potential of wake turbulence or sonic boom impacts on small aircraft from increased military aircraft operations.	Fox 3/Paxon MOA NJT
Safety-Live Fire	
Increase in live-fire training causing potential safety hazards and the creation of harmful situations and substances for citizens from increased wildfires, potential bombing, unexploded ordnance, and other toxins.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2205 RA JAGIC Missile Live-Fire

Table A-5. Key Issues by Resource Area *(continued)*

Issue	Relevant Proposed Actions
Safety (continued)	
Safety-Sonic Booms	
Increased frequency of sonic booms or expansion of areas used for supersonic operations could increase safety risks to citizens, particularly, concerns about mining and mines, small aircraft, high-altitude climbers or avalanches being triggered by sonic booms or noise vibrations.	Fox 3/Paxon MOA NJT
Potential for increased risk to people and other receptors from an increased radiofrequency environment from proposed military operations.	All proposed actions
Air Quality	
Increase in air pollution from increased military aircraft operations.	All proposed actions
Increase in air pollution from increased military vehicle and ground operations.	BAX RA Expand R-2202 RA JAGIC ISBs Ground Maneuver TFTA Access JPADS
Proposed military airspace operations potentially causing air pollution and impacting views of Mount McKinley and clear skies in nationally designated special areas.	Fox 3/Paxon MOA
Increase in particulate matter (primarily concerned with $PM_{2.5}$) from any of the proposed actions in the portions of the Fairbanks North Star Borough (FNSB) that are non-compliant with Federal $PM_{2.5}$ regulations.	All proposed actions
Physical Resources	
Potential for lowered special use airspace and increased military airspace operations to impact aircraft-supported exploratory geophysical surveys, drilling, and geologic investigations.	Fox 3/Paxon MOA UAV Access
Expansion of areas affected by sonic booms and noise potentially causing damage to high-altitude mountains and permafrost.	Fox 3/Paxon MOA NJT
Potential for soil erosion from off-road operations in ground maneuver area	Ground Maneuver TFTA Access ISBs
Potential for deep rutting from off-road excursions in areas with marginal permafrost	Ground Maneuver
Soil erosion from construction of roads and facilities and from disrupted natural drainage	JAGIC TFTA Access Ground Maneuver ISBs
Water Resources	
Need for single general 404 permit from all proposed military operations throughout Alaska.	All proposed actions
Increase in water pollution to lakes, streams, and rivers from proposed military operations, particularly from proposed live ordnance training, unexploded ordnance, or the leaching of toxic remnants.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA JAGIC Missile Live-Fire
Potential impact and loss of wetlands from construction of roads, facilities and other infrastructure.	RLOD JAGIC TFTA Access Ground Maneuver ISBs

Table A-5. Key Issues by Resource Area *(continued)*

Issue	Relevant Proposed Actions
Hazardous Materials and Waste	
Potential for live ordnance training, spent munitions, or subsequent potential unexploded ordnance to increase toxicity possibilities to humans, wildlife and other receptors on the land and in the GOA; potential to increase fire hazard where the State or Federal agencies will not fight fires because of the possibility of encountering unexploded ordnance or other materials that could pose a hazard.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA JAGIC Missile Live-Fire
Potential for increased military aircraft operations to cause increases in chaff residue, fuel dumping or hazardous waste spills and debris from aircraft crashes.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA NJT UAV Access JAGIC Missile Live-Fire JPADS
Potential for expanding areas with hazardous residues from use of munitions, and indirect effect on water resources	RLOD BAX RA Expand R-2202 RA JAGIC ISBs
Potential for proposed actions to pollute subsistence habitat or induce toxic substances into food chain.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA JAGIC Ground Maneuver TFTA Access ISBs Missile Live-Fire
Biological Resources	
Potential for proposed actions to impact wetlands and riparian areas, including fens, emergent wetlands, ponds, sloughs, watercourses, and scrub-shrub wetlands.	RLOD BAX RA Expand R-2202 JAGIC TFTA Access Ground Maneuver ISBs JPADS
Potential impact on State's ability to monitor game and wildlife populations, movement corridors, and provide predator control and aerial surveys.	Fox 3/Paxon MOA RLOD UAV Access
Potential impacts from proposed actions to sensitive ecological factors, such as habitat quality, calving areas, rutting areas, sensitive aquatic areas, and migration routes for both mammals and birds; and potential impacts on species from noise, low-level flights, startle effects, and sonic booms, particularly calving caribou/moose, the Nelchina caribou herd, Pacific, Copper River red, and king salmon (egg shock mortality), milking cows, egg-laying chickens and bird hatchings, migratory bird breeding grounds and migration routes for both mammals and birds, trumpeter swan nesting areas, the double-crested cormorant, birds-of-prey, including peregrine falcon aeries, bald eagle nests, etc., short-tailed albatross, sea life, grizzly and black bear, and others.	All proposed actions

Table A-5. Key Issues by Resource Area *(continued)*

Issue	Relevant Proposed Actions
Biological Resources (continued)	
Potential impact of the proposed Realistic Live Ordnance Delivery on game management unit 20A, which is mandated for intense management by Alaska Legislature specifically the management of moose for maximum sustained yield (food).	RLOD
Cultural Resources	
Impacts on archaeological resources, areas or districts; cultural landscapes; architectural resources, including National Register of Historic Places listings and historic placer mines; and Alaska Native cultural and traditional resources.	JAGIC Ground Maneuver TFTA Access ISBs Missile Live-Fire JPADS
Land Use	
Proposed military operations potentially impacting remote and pristine characteristics of wilderness areas, Wild and Scenic River areas, and other specially designated areas.	Fox 3/Paxon MOA Ground Maneuver TFTA Access ISBs Missile Live-Fire JPADS
Proposed airspace military operations potentially incompatible with the State and Federal land managers' ability to perform management activities and research as part of their authorized missions to manage lands for the public benefit and use.	Fox 3/Paxon MOA RLOD UAV Access
Land Use – Public Access	
Proposed military airspace operations potentially causing restrictions on citizens' ground access to public lands or impacting the quality of the citizens' experience in using the lands for hunting, flight-seeing, wild gathering, mining and development, and recreation due to land closures/restrictions or closures due to unexploded ordnance.	RLOD BAX RA Expand R-2202 RA TFTA Access Ground Maneuver JAGIC ISBs JPADS
Proposed military airspace operations limiting air access to private lands and public lands for multiple recreational, hunting and productive uses that depend on this mode of access.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA NJT UAV Access JAGIC Missile Live-Fire JPADS
Potential indirect impact to communities and villages from proposed military airspace operations limiting essential airspace access to villages, potentially causing safety issues.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA NJT UAV Access JAGIC Missile Live-Fire JPADS

Table A-5. Key Issues by Resource Area *(continued)*

Issue	Relevant Proposed Actions
Land Use (continued)	
Potential impact from new roads and trails on the environment, surrounding land use, wild and scenic areas, and lands previously inaccessible.	TFTA Access Ground Maneuver ISBs JPADS
Land Use – Recreation	
Proposed military operations and subsequent safety risks, change to the environment, and increases in noise levels and air traffic potentially incompatible with Alaskan's use of these lands, specifically recreation, hunting, subsistence, private air traffic, private commercial air traffic, climbing, hiking, mining, fishing, off-road recreation, snow machining, dog mushing, skijoring, winter climbing, backcountry skiing, trapping, exploring, skiing, boating in rivers and maritime, camping, floating bird/raptor watching.	Fox 3/Paxon MOA BAX RA Expand R-2202 RA Ground Maneuver TFTA Access ISBs JPADS
Proposed military airspace expansion potentially incompatible with nationally designated recreation areas, Federal campgrounds, and designated public use areas due to noise impacts.	Fox 3/Paxon MOA NJT
Potential impacts on hunting and hunting camps due to the potential timing of the proposals to interfere with hunting seasons, the quality of hunting experience or restricting access where heavily utilized; potential impacts on game populations from the scattering of herds, low-birth rates, and startle effects from proposed actions.	Fox 3/Paxon MOA RLOD BAX RA Expand R-2202 RA UAV Access TFTA Access Ground Maneuver ISBs Missile Live-Fire
Proposed military airspace operations potentially causing air pollution and impacting views of Mount McKinley and clear skies that contribute to the scenic and pristine qualities of specially designated areas.	Fox 3/Paxon MOA
Infrastructure and Transportation	
Potential impact from the proposed military operations on the regional transportation infrastructure including access, quantity, and the quality of the roads and the funds and resources required to maintain the routes.	TFTA Access
Potential impact from the proposed military operations on civilian aviation access and transport of residents, tourist companies, backcountry users, campers, hunters, fishers, and recreational flyers.	Fox 3/Paxon MOA BAX RA Expand R-2202 RA NJT UAV Access JAGIC Missile Live-Fire JPADS
Potential impact of proposed military operations on other new proposed projects, including dams and bridges and on communication systems, such as radios, cellular phones, television, etc.	All proposed actions
Potential impact from the proposed military operations to transportation along waterways by boat, particularly in the ocean.	All proposed actions
Socioeconomics	
Positive or negative impacts on the economy and local development from the proposed actions.	All proposed actions
Potential impact from proposed actions on subsistence hunting and sustenance.	All proposed actions
Population and demographic impacts from proposed military operations.	All proposed actions

Table A-5. Key Issues by Resource Area *(continued)*

Issue	Relevant Proposed Actions
Socioeconomics (continued)	
Potential for disruption from proposed airspace operations to resident population's personal freedoms, access to homes and recreation areas, quality of life, including desire for solitude, peace and quiet, and wilderness experience.	All proposed actions
Impacts on property values from proposed military operations.	All proposed actions
Potential impact from proposed actions on intrinsic qualities of the state that support tourism and local business and commerce, including the fishing industry, hunting, fishing and adventure guides and flight-seeing.	All proposed actions
Potential impact from proposed military airspace operations to businesses dependent on air travel, such as mining and hunting, fishing and adventure guides and flight-seeing.	Fox 3/Paxon MOA BAX RA Expand R-2202 RA NJT UAV Access JAGIC Missile Live-Fire JPADS
Subsistence	
Proposed military operations potentially restricting subsistence hunting and harvesting by limiting access by air or surface.	All proposed actions
Potential of proposed NJT to impact subsistence hunters and hunting.	NJT
Potential conflict between military operations with subsistence hunting due to the potential timing of the military operations in the fall, impacts on game populations from the scattering of herds, low-birth rates, and noise startle effects or pollution.	All proposed actions
Environmental Justice	
Potential for disproportionate effects on low-income populations, minorities, and children associated with airspace management, noise, safety, pollution, land use/access, socioeconomic, and subsistence impacts due to proposed military operations.	All proposed actions

Key: AGL=above ground level; MOA=Military Operations Area; $PM_{2.5}$=particulate matter 2.5 microns or less in diameter; RNAV=area navigation; UXO=unexploded ordnance; VFR=Visual Flight Rule.

<u>Abbreviation</u>	<u>Proposed Action</u>
Fox 3/Paxon MOA	Fox 3 MOA Expansion and New Paxon MOA
RLOD	Realistic Live Ordnance Delivery
BAX RA	Battle Area Complex (BAX) Restricted Area Addition
Expand R-2205 RA	Digital Multi-Purpose Training Range (Expand R-2205) Restricted Area
NJT	Night Joint Training
UAV Access	Unmanned Aerial Vehicle (UAV) Access
TFTA Access	Tanana Flats Training Area (TFTA) Roadway Access
Ground Maneuver	Enhanced Access to Ground Maneuver Space
JAGIC	Joint Air–Ground Integration Complex
ISBs	Intermediate Staging Bases
Missile Live-Fire	Missile Live-Fire for AIM-9 and AIM-120 in the Gulf of Alaska
JPADS	Joint Precision Airdrop System Drop Zones

Table A-6. Comments by Proposed Action and EIS Resource Area or Topic

EIS Resource Area or Topic	Number of Comments											Total
	General	Fox/ Paxon	Realistic Live Ordnance Delivery	JCALF	UAV Corridors	Night Joint Training	Proposed Missile Live Fire	Enhanced Ground Maneuver Space Access	JAGIC	ISBs	JPADS	
Proposed Action and Alternative(s)	248+	31	33	14	34	17	16	11	3	9	3	419+
Purpose and Need	21	20	0	0	3	2	1	3	2	3	0	55
Suggested New Alternative(s)	82+	61+	4	1	16	1	0	3	1	2	0	171+
Airspace Management and Use	136+	286+	3	15	51+	6	0	0	0	0	0	497+
Noise	51+	115+	1	1	1	7	2	0	0	0	0	178+
Health, Safety, and Security	75+	107	7	9	13	2	2	0	0	1	0	216+
Air Quality	4	2	1	0	0	0	0	0	0	0	0	7
Terrestrial Resources	1	1	0	0	0	0	0	0	0	0	0	2
Water Resources	2	2	0	0	0	0	0	0	0	0	0	4
Hazardous Materials and Waste (HTRW, Munitions, Solid Waste, Regulatory Programs)	39	2	4	0	0	0	2	1	0	0	0	48
Biological Resources	77+	133+	3	2	2	3	5	1	0	0	0	226+
Cultural Resources	3	2	1	0	0	0	0	0	0	0	0	6
Land Use	180+	261+	4	1	1	4	2	6	0	0	1	460+
Infrastructure and Transportation	18	5	0	0	0	0	1	0	0	0	0	24
Socioeconomics	68+	86	1	0	7	0	1	1	0	0	0	164+
Environmental Justice and Risks to Children	2	1	0	0	2	0	0	0	0	0	0	5
Other	87+	0	0	0	0	0	0	0	0	0	0	87+
Total	1,097+	1,115+	62	43	130+	42	32	26	6	15	4	2,569

Key: EIS=environmental impact statement; HTRW=hazardous, toxic, and radioactive waste; ISB=Intermediate Staging Base; JAGIC=Joint Air–Ground Integration Complex; JCALF=Joint Combined Arms Live Fire; JPADS=Joint Precision Airdrop System; UAV=unmanned aerial vehicle.

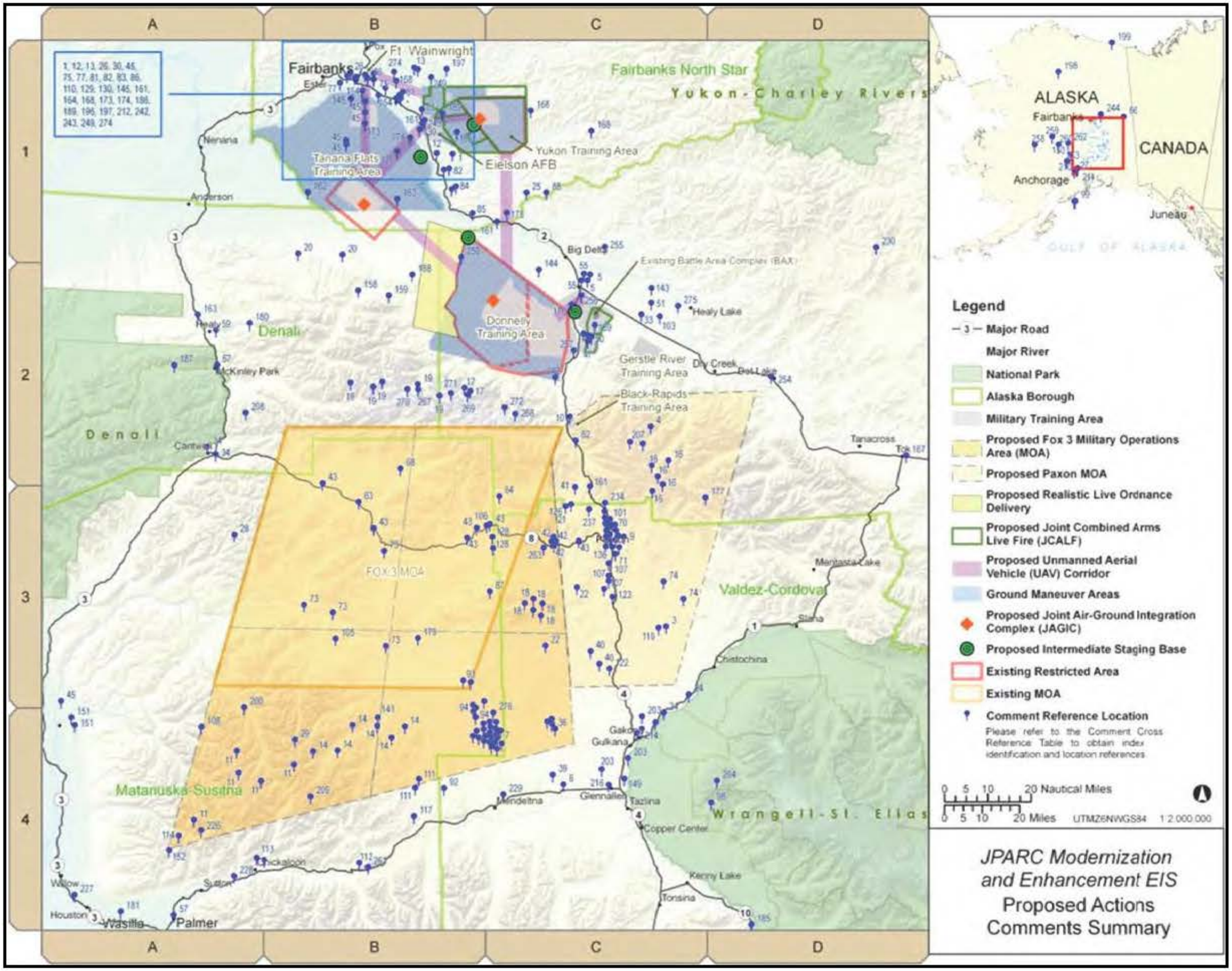


Figure A-1. ***JPARC Modernization and Enhancement EIS*** **Proposed Actions Comments Summary Map (See Table A-7)**

Table A-7. Areas and Locations of Comments and Map ID and Reference Locations

Location	Map ID	Map Reference
AK41 Airstrip	1	B-1
Alaska (General)	230	D-1
Alaska Range	19	B-2
Alaska Range Foothills	20	B-1
Allen AAF	256	C-2
Alphabet Hills	87	C-3
Anchorage	27	–
Arctic National Wildlife Refuge	199	–
Area between Anchorage and Fairbanks	28	A-3
Area between the Glenn Highway and the Denali Highway	29	B-4
Area north of and between Fort Wainwright and Eielson AFB	30	B-1
Backcountry near Talkeetna	200	A-4
Birch Lake	85	B-1
Black Rapids	142	C-2
Blair Lakes	183	B-1
Bonnifield Mining District	159	B-2
Buffalo MOA	33	C-2
Cantwell	34	A-2
Chena Hot Springs	244	–
Chena Hot Springs Road	13	B-1
Chena Lakes SRA	196	B-1
Chena River	249	B-1
Chickaloon	113	A-4
Chickaloon	202	B-4
Chickaloon/Sheep Mountain Pass	261	B-4
Chugiak	210	–
Clarence Lake	105	B-3
Coal Mine Lakes	50	C-2
Coal Mine Road area to Jarvis Creek	2	C-2
Copper Basin	3	C-3
Copper River	24	C-3
Copper River	32	C-4
Copper River Basin	213	C-3
Copper River Basin	119	C-4
Copper River Valley	203	C-4
Crosswind Lake	36	C-4
Delta	55	C-2
Delta Area under Paxon MOA	4	C-2
Delta Controlled Use Area	103	C-2
Delta Junction	5	C-2

Table A-7. Areas and Locations of Comments and Map ID and Reference Locations (*continued*)

Location	Map ID	Map Reference
Delta Junction Management Area	51	C-2
Delta MOA	255	C-1
Delta National Wild and Scenic River	21	C-3
Delta Range	207	C-2
Delta River	41	C-3
Delta Wild Scenic River	126	C-3
Denali Block	64	C-3
Denali Borough	208	A-2
Denali Highway	65	–
Denali Highway	53	B-3
Denali Highway	43	C-3
Denali Highway Archaeological District	263	C-3
Denali Highway Corridor	63	B-3
Denali National Park	187	A-2
Denali Park	67	A-2
Donnelly Dome	257	C-2
Eagle River	211	–
Eagle, 35 miles west of	66	–
East and south of proposed Fox 3	69	B-3
East of Delta	143	C-2
East of Fairbanks	274	B-1
East of Fairbanks and north of the Alaska Highway	25	C-1
East of Fort Wainwright	75	B-1
Eielson AFB	243	B-1
Eielson Farm Road	130	B-1
Eielson Flight Path Area	12	B-1
Eureka	117	B-4
Fairbanks	26	B-1
Fairbanks International Airport	77	B-1
Fairbanks North Star Borough	212	B-1
Fielding Lake	237	C-3
Flight path between Eielson AFB and Blair Lakes	129	B-1
Fort Wainwright	86	B-1
Fort Wainwright	242	B-1
Fox 3 MOA	14	B-4
Gakona	214	C-4
Gates of Arctic National Park	198	–
Glennallen	149	C-4
Glennallen	216	C-4
Glenn Highway west of Glennallen	6	C-4
GMU 13	18	C-3

Table A-7. Areas and Locations of Comments and Map ID and Reference Locations (*continued)*

Location	Map ID	Map Reference
GMU 16B	273	–
GMU 20	88	C-1
Gulf of Alaska	99	–
Gulkana National Wild and Scenic River	22	C-3
Gulkana River	40	C-3
Harding Lake	84	B-1
Hatcher Pass	152	A-4
Hatchery on the river at Paxson	136	C-3
Hayes Range	17	B-2
Healy	59	A-2
Hess Mountain	270	B-2
Isabel Pass	234	C-3
Jarvis Creek area	47	C-2
JCALF area	190	B-1
JCALF area	189	C-2
John Lake	92	B-4
Knob Ridge RCO	254	D-2
Lake Louise	52	B-4
Lake Louise	7	C-4
Little Delta	250	B-1
Lodge at Black Rapids	10	C-2
Maclaren River	128	C-3
Maclaren River Lodge	106	C-3
Matanuska Valley	228	A-4
Matanuska-Susitna	226	A-4
Matanuska-Susitna	209	B-4
Matsu Valley	227	A-4
Meiers Lakes	123	C-3
MOA near Talkeetna	108	A-4
Mosse Creek	83	B-1
Mount Balchan	271	B-2
Mount Deborah	267	B-2
Mount Hayes	269	B-2
Mount McGinnis	268	C-2
Mount McKinley	262	–
Mount Moffit	272	C-2
Near Eielson	110	B-1
Nelchina	111	B-4
North of Alaska Highway	275	C-2
North of Stony MOA	258	–
North of Wasilla	114	A-4

Table A-7. Areas and Locations of Comments and Map ID and Reference Locations (*continued*)

Location	Map ID	Map Reference
North Paxson Lake	71	C-3
North Pole	81	B-1
Northwest of Susitna MOA	260	–
Oshetna River, airstrip	141	B-4
Palmer	57	A-4
Parks Highway	163	A-2
Paxon MOA	16	C-2
Paxon MOA	116	C-3
Paxson	9	C-3
Paxson Lake	107	C-3
Range 6 west approximately 7 air miles north northeast of the lodges on Lake Louise	276	C-4
Richardson Highway	166	B-1
Richardson Highway	161	C-1
Richardson Highway	235	C-3
Richardson Highway Corridor	62	C-2
RLOD area	188	B-2
Salcha	82	B-1
Sheep Mountain	112	B-4
Sourdough	122	C-3
South of Fairbanks	145	B-1
South Summit Lake	70	C-3
Southeast of Galena MOA	259	–
Southern Alaska Range	177	C-3
Summit Lake	101	C-3
Susitna Lake	94	B-4
Susitna MOA	150	–
Susitna River	73	B-3
Talkeetna	151	A-4
Talkeetna Mountains	11	A-4
Talkeetna Mountains	201	B-4
Tanana Flats	156	A-3
Tanana Flats	45	B-1
Tanana River	164	B-1
Tangle Lakes	42	C-3
Tazlina	229	C-4
Tok	167	D-2
Tolsona Lake	39	C-4
Trust Land	169	B-1
Trust Land	168	C-1
Two Rivers trail system	197	B-1

Table A-7. Areas and Locations of Comments and Map ID and Reference Locations (*continued)*

Location	Map ID	Map Reference
Tyone Lake	93	B-3
UAV A	173	B-1
UAV C	174	B-1
UAV F	175	C-1
UAV G	176	C-2
Upper Copper River Basin	74	C-3
Upper Susitna Valley	179	B-3
Upper Susitna Watershed	68	B-2
Usibelli	180	A-2
Wasilla	181	A-4
West of Delta	144	C-2
Wood River	182	B-1
Wood River Canyon	158	B-2
Wrangell	98	D-4
Wrangell Mountains, Chitina	185	D-4
Wrangell-St. Elias	264	D-4
Yukon Training Area	186	B-1

Key: AAF = Army Air Field; AFB = Air Force Base; GMU = Game Management Unit; JCALF = Joint Combined Arms Live Fire; MOA = Military Operations Area; RLOD = Realistic Live Ordnance Delivery; SRA = State Recreation Area; UAV =unmanned aerial vehicle

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Appendix B
Definition of the Resources and Regulatory Settings

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ACRONYMS AND ABBREVIATIONS

11th AF	11th Air Force
AAC	Alaskan Air Command
ACMAC	Alaska Civil/Military Aviation Council
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFI	Air Force Instruction
AFS	Alaska Fire Service
AGL	above ground level
AHERA	Asbestos Hazard Emergency Response Act
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
ALCOM	Alaskan Command
ALCOM/PA	Alaskan Command Public Affairs Office
ANCSA	Alaska Native Claims Settlement Act
ANG	Air National Guard
ANHP	Alaska Natural Heritage Program
ANILCA	Alaska National Interest Lands Conservation Act
ANSI	American National Standards Institute
AP	Area Planning
AQCR	air quality control region
AR	Army Regulation
ARRC	Alaska Railroad Corporation
ARTCC	Air Route Traffic Control Center
AS	Alaska Statute
AST	aboveground storage tank
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATV	all-terrain vehicle
BA	biological assessment
BASH	bird-wildlife aircraft strike hazard
BAX	Battle Area Complex
BLM	Bureau of Land Management
BRTA	Black Rapids Training Area
CDNL	C-weighted day-night average sound level
CEA	Chugach Electric Association
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFA	Controlled Firing Area
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CRTC	Cold Regions Test Center
CVEA	Copper Valley Electric Association
CWA	Clean Water Act
DA PAM	Department of the Army Pamphlet
dB	decibels
dBP	peak decibel noise levels
DERP	Defense Environmental Restoration Program
DNL	day-night average sound level
DoD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DTA	Donnelly Training Area
EA	environmental assessment
EIS	environmental impact statement
ENMP	Environmental Noise Management Program (Army)
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FL	flight level
FLPMA	Federal Land Policy and Management Act
FNSB	Fairbanks North Star Borough
FUDS	Formerly Used Defense Sites
FWA	Fort Wainwright, Alaska

GHG	greenhouse gas
GIS	geographic information system
GMU	Game Management Unit
GOA	Gulf of Alaska
GRTA	Gerstle River Training Area
GVEA	Golden Valley Electric Association
GWP	global warming potential
HAP	hazardous air pollutant
HC	hydrocarbon
HEA	Homer Electric Association
Hz	hertz
ICRMP	Integrated Cultural Resources Management Plan
IFR	Instrument Flight Rules
INRMP	Integrated Natural Resource Management Plan
IRP	Installation Restoration Program (DoD)
IR	instrument route
ISB	Intermediate Staging Base
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JBER	Joint Base Elmendorf-Richardson
JPARC	Joint Pacific Alaska Range Complex
kV	kilovolts
LATN	low-altitude tactical navigation
L_{cdn}	C-weighted day-night average sound level
L_{dnmr}	onset rate-adjusted day-night average sound level
L_{eq}	equivalent continuous sound pressure level
L_{max}	maximum noise level
L_{pk}	peak noise level
LRAM	Land Rehabilitation and Maintenance
MACA	mid-air collision avoidance
MBTA	Migratory Bird Treaty Act
MFE	major flying exercise
ML&P	Anchorage Municipal Light and Power
MLRA	major land resource area
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MOA	Military Operations Area
MOUT	Military Operations on Urban Terrain
MSL	mean sea level
MTR	Military Training Route
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act
NHS	National Highway System
NM	nautical mile
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
ORRV	off-road recreational vehicle
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
ppm	parts per million
PSD	prevention of significant deterioration
psf	pounds per square foot
RCRA	Resource Conservation and Recovery Act
RF	Radio Frequency
RMO	Range Management Office
RNAV	area navigation
ROI	region of influence
RPA	remotely piloted aircraft
RTLA	Range and Training Land Assessment
SARA	Superfund Amendments and Reauthorization Act
SDZ	surface danger zone
SES	Seward Electric System

SH	State Highway
SIP	state implementation plan
SPCC	Spill Prevention Control and Countermeasure (Rule)
SRA	State Recreation Area
SUA	Special Use Airspace
SUAIS	Special Use Airspace Information System
SWDA	Solid Waste Disposal Act
TFTA	Tanana Flats Training Area
TMAA	Temporary Maritime Activities Area
tpy	tons per year
TRACON	Terminal Radar Approach Control
TRI	training requirements integration
TSCA	Toxic Substances Control Act
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAG-FRA	U.S. Army Garrison Fort Richardson, Alaska
USAG-FWA	U.S. Army Garrison Fort Wainwright, Alaska
USARAK	U.S. Army Alaska
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UXO	unexploded ordnance
VFR	Visual Flight Rules
VOC	volatile organic compound
VR	visual route
W-	Warning Area; e.g., Warning Area 612 (W-612)
WRCC	Western Regional Climate Center
WSR	Wild and Scenic Rivers
YTA	Yukon Training Area

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APPENDIX B
DEFINITION OF THE RESOURCES AND REGULATORY SETTINGS

This chapter presents an overview of the resources, ecosystems, and human communities of concern that could be affected by the enhancement and modernization proposals for the Joint Pacific Alaska Range Complex (JPARC).

Each resource discussion begins with a definition of the resource attributes. A description of applicable environmental or managerial regulations, Federal and state, is provided for each resource. Pertinent local regulations and resource management plans are also identified. A general description of the existing conditions for the resource is provided, focusing on the regional context. The regional context encompasses areas potentially affected by the geographic extent of any of the JPARC enhancement proposals addressed in this environmental impact statement (EIS). Relevant details on the affected environment of each resource are provided for each proposal in Chapter 3.

The key government agencies involved with the *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska (JPARC Modernization and Enhancement EIS)* have established standard lists of environmental impact topics or categories that are typically evaluated in their National Environmental Policy Act (NEPA) documents. Table B–1 provides a breakdown by the responsible Federal agencies of the various topics and resource analyses covered in this EIS.

Table B–1. Environmental Impact Resource Mapping

EIS Resources	Air Force Resource Categories	Army Valued Environmental Component Categories	FAA Impact Analysis Categories
Airspace Management • Coordination/ATC • Military • Commercial Aviation • General Aviation • Emergency Access (fire, RX)	Airspace Management	Airspace Management	Airspace Management
Noise • Single events/frequency • Average noise levels in SUAs (L_{dnmr}) • Sonic Booms (event (frequency) effects) • CDNL/Impulsive Noise • Annoyance/population	Noise	Noise	Noise, Compatible Land Use
Safety (flight) • Mishaps • BASH • Radio Frequency (RF) Management	Safety (Flight)	Radio Frequency Management, Fire Management (access), Safety	Compatible Land Use
Safety (Ground) • APZ, CZs • Occupational • Explosives (WDZs, storage and handling, transport, UXO) • Public access control • Fire Management	Safety (Ground)	Radio Frequency hazards, Fire Management, Safety	Environmental health and Safety Risks, Compatible Land Use
Air Quality • Conformity • Greenhouse Gases (GHGs) • PSD Class 1 areas	Air Quality and GHGs	Air Quality and GHGs	Air Quality
Physical Resources • Geologic/seismic • Soils (erosion) • Wet Areas and Permafrost	Physical Resources	Soils and Permafrost, Wetlands, Geological resources	Construction impacts, Farmlands, Floodplains, Wetlands
Water Resources • Water Quality • Water Quantity (regional supply) • Floodplains • Wet Areas/Permafrost	Water Resources	Water Resources (Surface Water and Groundwater)	Water quality, Construction impacts

Table B-1. Environmental Impact Resource Mapping (*continued*)

EIS Resources	Air Force Resource Categories	Army Valued Environmental Component Categories	FAA Impact Analysis Categories
Hazardous Materials and Waste • Hazardous Materials (storage, handling, spills) • Hazardous Waste (quantities, disposal) • Munitions (residues, UXO)	Hazardous Materials and Waste	Hazardous Materials and Waste	Hazardous Materials/PP/Solid Waste
Biological Resources • Vegetation • Wildlife • Fisheries/Aquatic/marine • Migratory Birds • Protected Species/habitats • Mortality from BASH • Wetlands • Game/fish/vegetation management (herd/population management, burns)	Biological Resources	Wildlife and Fisheries, Vegetation, Wetlands	Coastal Resources, Construction impacts, Fish/ Wildlife/Plants, Wetland habitats
Cultural Resources • Archaeological • Historical • Architectural • Cultural/traditional/native resources	Cultural Resources	Cultural Resources	Construction impacts, Historical/Architectural/ Archaeological/Cultural resources
Land Use • Ownership/jurisdiction • Land Uses (management controls) • Public access/trails etc • Special Use Areas (e.g., WSRs) • ROW/Access/Transport • Recreation (activities, hunting/ fishing use, management) • Visual Resources	Land Use	Land Use Visual resources, Access, Subsistence and Recreation,	Compatible Land Use, Farmlands, Light Emissions/Visual impacts, WSRs
Infrastructure/Transportation • Energy and Utilities (public services) • Public highways, and infra (rail, bridges) • Traffic, capacity, network	Infrastructure and Transportation	Traffic/Transportation, Energy, Utilities	Natural Resources and Energy supply

Table B-1. Environmental Impact Resource Mapping (*continued*)

EIS Resources	Air Force Resource Categories	Army Valued Environmental Component Categories	FAA Impact Analysis Categories
Socioeconomics • Population • Economic activity • Public services	Socioeconomics	Socioeconomics, Subsistence (Customary trade)	Natural Resources and Energy supply, Socioeconomic impacts
Subsistence • Subsistence areas and jurisdiction • Subsistence users and activities • Subsistence Resources (biological resource sustainability) • Subsistence economies/livelihood	Not generally applicable	Not generally applicable Subsistence (USARAK NEPA documents)	Not generally applicable
Environmental Justice • Minorities (including Alaska Natives) • Low income populations • Children	Environmental Justice	Environmental Justice, Subsistence impacts	Environmental Justice and Children's Environmental Health and Safety Risks

Key: APZ=Accident Potential Zone; ATC =air traffic control; BASH=bird/wildlife-aircraft strike hazard; BLM= Bureau of Land Management; CDNL=C-weighted day-night average sound level; CZ=clear zones; FAA=Federal Aviation Administration; GHG=greenhouse gases; PP=Pollution Prevention; PSD=prevention of significant deterioration; ROW=Right of Way; RX=medical emergency; SUA=Special Use Airspace; UXO=unexploded ordnance; WDZ=weapon danger zone; WSR=Wild and Scenic River.

B.1 AIRSPACE MANAGEMENT

B.1.1 Definition of Resource

The nation's airspace is designed and managed by the Federal Aviation Administration (FAA) in a manner that strives to meet both the individual and common needs of all military, commercial, and general aviation interests. In general, all navigable airspace is categorized as either regulatory or nonregulatory. Within those two categories are four types of airspace: Controlled, Special Use, Uncontrolled, and Other. Airspace is further defined in terms of classifications according to the operating and flight rules that apply to each airspace area. The manner in which airspace is classified is dependent on (1) the complexity or density of aircraft operations within an airspace area, (2) the nature of those operations, (3) the level of safety required, and (4) national and public interest. Airspace management discussions reference these types/classifications, where appropriate, as they relate to the JPARC proposal regions of influence (FAA 2008).

Table B–2 provides basic definitions of the more-common aeronautical terms used throughout the airspace management sections.

Table B–2. Aviation and Airspace Use Terminology

Term	Definition
Visual Flight Rules (VFR)	A standard set of rules that all pilots, both civilian and military, must follow when not operating under IFR and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.
Instrument Flight Rules (IFR)	A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than VFR. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by FAA regulations, and operating in some locations such as major civilian airports. ATC agencies ensure separation of all aircraft operating under IFR.
Above Ground Level (AGL)	Altitude expressed in feet measured above the ground surface.
Mean Sea Level (MSL)	Altitude expressed in feet measured above average (mean) sea level.
Flight Level (FL)	Manner in which altitudes at 18,000 feet MSL and above is expressed, as measured by a standard altimeter setting of 29.92. For example, an aircraft flying at 20,000 feet MSL is considered to be at FL200.
Sortie/Sortie-Operation	Sortie refers to an operational mission conducted by a single aircraft. Sortie-operation refers to a flight activity conducted by that single aircraft within a designated airspace area during the sortie mission. Airspace use tracking typically accounts for an aircraft sortie-operation within each area it operates throughout the course of the overall training mission.

Key: FAA=Federal Aviation Administration; ATC=air traffic control; AGL=above ground level; MSL=mean sea level; FL=flight level.
Source: FAA 2011a.

Controlled airspace is airspace of defined dimensions within which Air Traffic Control (ATC) services are provided to Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) flights in accordance with the airspace classification (FAA 2011a). Controlled airspace is categorized into five separate classes: Classes A through E. These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place to place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace class. Military flight crews fly under FAA rules when not training in Special Use Airspace (SUA). Uncontrolled airspace (designated as Class G) has no specific prohibitions associated with its use. See Appendix D for a description of all airspace classifications and designations.

B.1.2 Regulatory Setting

The U.S. Government has exclusive sovereignty over all airspace and Congress has charged the FAA with the responsibility to develop plans and policy for the use of the navigable airspace and to assign by regulation or order, the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 U.S.C. 40103(a) and (b)).

The FAA recognizes that air traffic, aviation, and technology are constantly evolving and continues to seek ways to improve safety, efficiency, and flexibility, while working with the public on quality-of-life concerns. For that reason, airspace use is constantly reviewed by the FAA, U.S. Department of Defense (DoD), airport operators, and other affected stakeholders to ensure operational efficiency, user compatibility, and flight safety are maintained to the greatest extent possible. In that regard, DoD agencies that use airspace are required to submit annual utilization reports for SUA to the FAA that describe the types of activities conducted in the airspace, the times and altitudes used, and other such details that characterize airspace use. The FAA uses this information in its overall management of the National Airspace System and SUA program (FAA 2008).

SUA identified by the FAA for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order 7400. 2H (FAA 2011b) and other applicable regulations and orders. Prior to any SUA charting, the initial proposal for this airspace—as an Military Operations Area (MOA) or restricted area, for example—and the potential consequences of this action for the environment and other airspace uses in the region must be examined by the proponent through NEPA processes, to include completion of an environmental assessment (EA) or EIS. Once this process is completed, to include public review and comment, the preferred airspace alternative is examined in greater depth by the FAA in an Aeronautical Study that identifies specific impacts on the National Airspace System and how those impacts may be minimized through mitigation measures. This study may also result in modifications to the proponent's airspace proposal if necessary.

The U.S. Air Force requests airspace from the FAA and schedules and uses airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, Air Force Airspace Management (Air Force 2006a). AFI 13-201 implements Air Force Planning Document 13-2, Air Traffic Control, Airspace, Airfield, and Range Management (Air Force 2007a), and DoD Directive 5030.19, DoD Responsibilities on Federal Aviation and National Airspace System Matters (DoD 1997). It addresses the development and processing of SUA, and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations. Alaskan SUA is managed by both the 11th Air Force (11th AF) Commander and the U.S. Army Alaska (USARAK) Commander.

Army Regulation (AR) 95-2, *Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids* (Army 2007a), covers Army policy, responsibilities, procedures and rules for airspace, airfields/heliports, flight activities, air traffic systems and navigational aids. Additionally, DoD Directive 5030.19 establishes procedures and policy regarding DoD and FAA coordination of matters impacting the Federal airspace system. Specific instructions for operating remotely piloted aircraft (RPA)/unmanned aerial vehicles (UAVs) are contained in FAA Order 7610.4P, *Special Military Operations* (FAA 2009). Further description of procedures and approvals governing the operations of UAV is provided in Section 3.6.3.1 in the EIS.

B.1.3 General Description of Affected Environment

B.1.3.1 Military Use Airspace

The Alaska airspace used by each of the Services to conduct their respective and joint training requirements include MOAs with overlying Air Traffic Control Assigned Airspace (ATCAAs), restricted areas, military training routes (MTRs), warning areas, and Controlled Firing Areas (CFAs). The following sections describe the structure, representative annual use, and the responsible scheduling/using agency for each JPARC airspace area. Representative annual use reflects the number of sortie-operations that are typically conducted by the different aircraft types during a full annual schedule of exercise and training activities. Estimated future sortie-operations consider this representative use, planned aircraft realignments, and other actions that may affect future JPARC operations. More-detailed information on airspace use and management is provided for the specific proposed actions in Chapter 3.

This section also identifies jet routes, Federal airways, and corridors used by transiting civil aviation aircraft within the proximity of JPARC airspace. The locations and use of those airspace areas are considered in determining JPARC airspace actions.

JPARC Airspace Scheduling Responsibilities/Procedures. Processes for managing, coordinating, and scheduling use of the individual JPARC airspace areas are the responsibility of the different service organizations designated as the scheduling agency for each. Procedures and guidance for Air Force scheduling of this airspace is contained in AFI 13-212, *Range Planning and Operations* (Air Force 2007b), 11th AF Supplement 1, and the 11th Airspace Handbook. In most cases, MOAs, ATCAAs, and MTRs are used primarily for Air Force aircrew training and exercises where there are minimal multiservice competing needs for this airspace. For those ranges and associated restricted areas having competing multiservice requirements, procedures have been established for coordinating use of this airspace in a Memorandum of Agreement USARAK-MOA-040 (supersedes AK-MOA-153) between USARAK, U.S. Army Garrison Fort Wainwright, Alaska (USAG-FWA), 11th AF, and the Cold Regions Test Center (CRTC).

This Agreement identifies the responsible scheduling/using agency for each range/restricted area and delineates range scheduling protocols, scheduling priorities, range activation/deactivation and clearance authorities, authorized ordnance, and ground operations responsibilities to be adhered to by all user agencies. Range/restricted area use normally requires scheduling a minimum of 28 days prior to the requested training date; is based on priorities, regardless of the service branch; and is offered on a first-come, first-served basis. Shared use of these assets by multiple components is accommodated to the extent possible. Any conflicts are resolved through coordination among the responsible range controlling agencies, such as the monthly scheduling meetings, to help ensure use of the Alaska ranges and associated restricted areas is managed in a manner that strives to meet all airspace user requirements (Air Force 2010).

MOAs/ATCAAs. The horizontal and vertical structures of the Alaska MOAs/ATCAAs (shown in Figure B-1) vary, depending on their locations relative to the civil air traffic routes, land uses, natural resources, and other factors that have been considered in the establishment of each area. The types of activities typically conducted in the MOAs and their overlying ATCAAs include air combat tactics, basic fighter and air combat maneuvers, composite force training, intercept training, low-altitude air-to-air training, low-altitude step-down training, and simulated low-altitude surface attack tactics. Several of the MOAs/ATCAAs provide maneuvering airspace for conducting air-to-ground weapons activities within the ranges and restricted areas. Appendix D includes the description and representative use of each Alaska MOA/ATCAA.

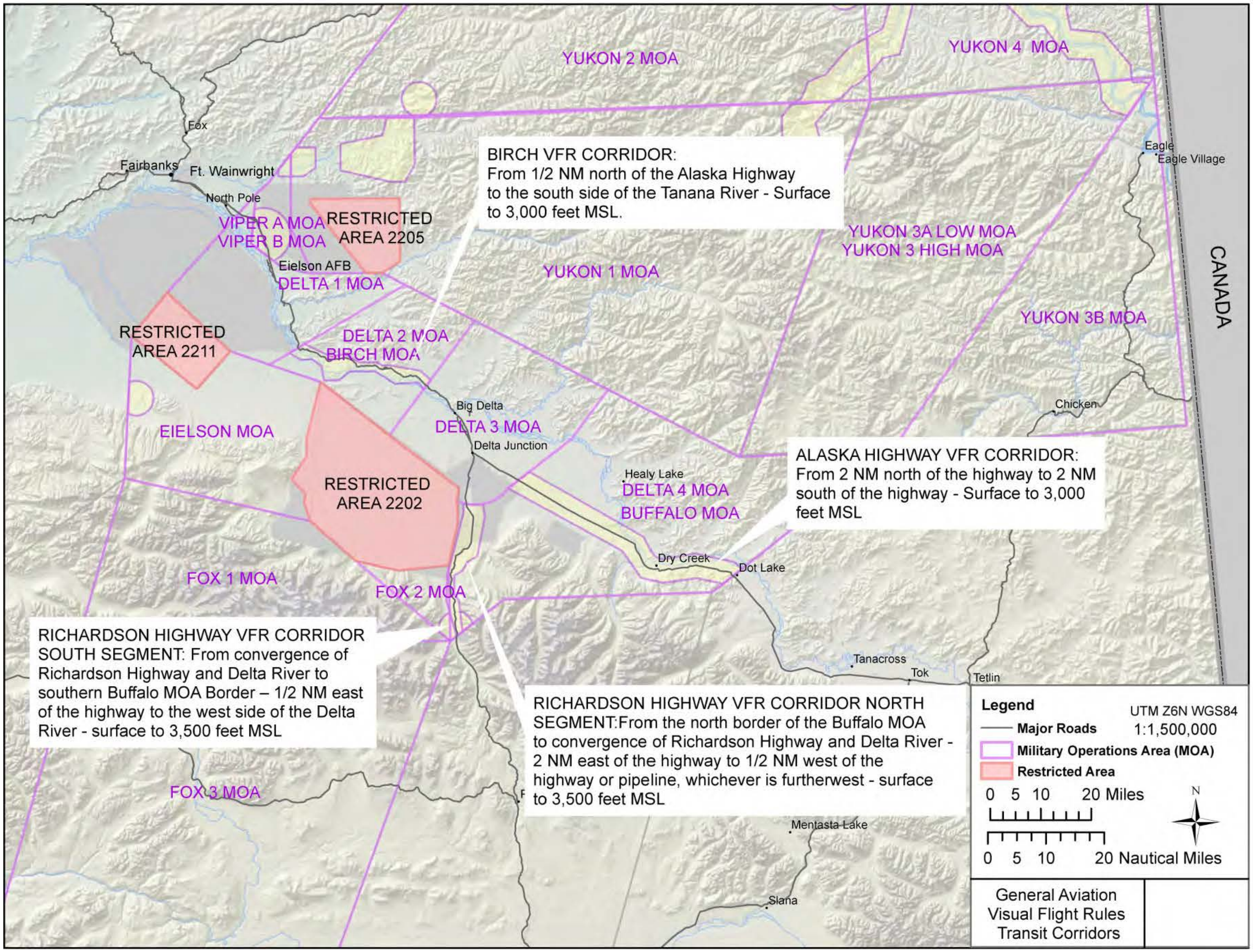

Figure B-1. Visual Flight Rules Corridors

A Finding of No Significant Impact was issued in January 2010 for an EA that proposed charting of a permanent Delta MOA within airspace activated as temporary Delta MOAs (Delta 1-4 T-MOAs) to provide a corridor for transiting the Yukon/Fox Complex during major flying exercise (MFE) periods. This action to establish a permanent Delta MOA focused primarily on alleviating impacts on MFE mission accomplishment within the Yukon/Fox Complex.

Restricted Airspace. The restricted areas shown in Figures 1–2 and described in Table 2–5 provide protected airspace to confine hazardous air and range-based training activities. Range training areas, associated with restricted airspace, provide capabilities for conducting weapons delivery, small-arms live-fire training, and other such training operations. These areas usually include instrumentation, airfields, drop zones, landing zones, and other infrastructure for training and logistical support. Combined with the MOAs/ATCAAs, restricted airspace and ground training areas provide the capability to drop live and inert weapons on instrumented ranges in large, complex flying evolutions.

Military Training Routes. The MTRs described in Appendix D are used to conduct low-level, high-speed training to help pilots remain proficient in a variety of functions, such as avoidance of enemy detection and destruction, air defense, strategic and tactical bombing, electronic warfare, and tactical reconnaissance. An EA was completed in 2007 for proposed modifications to the Alaska MTR structure managed by 11th AF. These changes, now in effect, better serve air combat training requirements. The MTRs provide access to MOAs and restricted airspace primarily for routine training and, to a lesser extent, MFEs. Both instrument routes (IRs), which allow flight in IFR conditions, and visual routes (VRs), which limit flight to VFR conditions, are used primarily by C-17s, C-130s, and fighter-type aircraft (F-15s, F-16s, and F-22s). Most of the MTRs in Alaska are co-located in groups of four, consisting of two reversible IRs and two reversible VRs, such that training along these routes can be conducted in either direction following the same ground track. All routes have a maximum width of 5 nautical miles (NM) on either side of the centerline. Published hours of use are 8:00 a.m. to 8:00 p.m. (Air Force 2007c).

Low-Altitude Tactical Navigation Areas. Low-altitude tactical navigation areas (LATNs) are defined geographic areas within which low-altitude navigation can be practiced. Aircrew training in LATNs fly in accordance with FAA flight rules, and such training is not considered to be hazardous to nonparticipating aircraft. FAA and Air Force regulations require aircraft utilizing the LATN to avoid airfields, towns, noise-sensitive areas, and wilderness areas by prescribed vertical and/or horizontal distances. Aircraft must fly at airspeeds of 250 knots (288 miles per hour) or less and are precluded from flying over the same point more than once per day.

Warning Area/Gulf of Alaska. The Temporary Maritime Activities Area (TMAA) in the Gulf of Alaska is roughly rectangular, oriented from northwest to southeast, approximately 300 NM long by 150 NM wide, and situated south of Prince William Sound and east of Kodiak Island (shown in Figure 1–1). The TMAA extends from the surface to flight level (FL) 600 and is scheduled by the Pacific Fleet. This over-water airspace supports most aircraft training activities conducted by Navy and Joint Service aircraft throughout the Northern Edge exercise. Approximately 450 sorties are conducted annually within the TMAA. The TMAA includes surface and subsurface operating areas and overlying airspace that includes Warning Area 612 (W-612) located over Blying Sound. W-612 extends from the surface to FL290, and the scheduling agency for this airspace is the 3rd Wing. When not included as part of the TMAA, W-612 is used by the Air Force to conduct training in anti-air warfare and by the U.S. Coast Guard to fulfill some of its training requirements. Most Navy training activities occur in the TMAA (Navy 2011).

Controlled Firing Areas. Several CFAs have been established for USARAK's use in conducting small-arms, mortar, and artillery firing. The Battle Area Complex (BAX) CFA provides protected airspace for the training activities within the general area proposed for restricted airspace. The Combined Arms Live

Fire Exercise North and South CFAs are established over portions of the Yukon Training Area and are within the general area proposed for the Digital Multipurpose Training Range (expanded R-2205).

B.1.3.2 Civil Aviation Airspace Use

Civil aviation includes two major categories: scheduled air transport, including all passenger and cargo flights operating on regularly scheduled routes; and general aviation, including all other civil flights, private or commercial. The airspace most generally used by civil aviation aircraft consists of jet routes, Area Navigation (RNAV) routes, Victor Airways, general aviation corridors, and both public airports and private airfields. Information regarding the general use of these routes, corridors, and airports is discussed in the Chapter 3, Airspace Management and Use, affected environment as they relate to the proposed airspace actions.

A key forum for addressing common areas of interest to both the military and civil aviation communities is the Alaska Civil/Military Aviation Council (ACMAC). The ACMAC consists of representatives from the Air Force, Army, FAA, airports, pilot associations, and other stakeholders with the purpose of keeping all participants updated on the respective plans and initiatives that affect aircraft operations and airspace use within Alaska. This forum meets on a semi-annual basis and rotates among different locations to help encourage attendance and representation. While not an authoritative function, the information and concerns expressed at the ACMAC meetings may be considered by the respective military or civilian participants in the decisionmaking processes.

Jet Routes and Area Navigation Routes. Jet routes and RNAV routes encompass the high-altitude (FL180-450) en route system used by air carriers to transit the Alaska airspace. RNAV routes transiting the region provide more-direct routing and reduce flight distances for IFR domestic and international flights operating through this area. Those jet and RNAV routes potentially affected by the proposed actions and their average daily use are discussed in Chapter 3, Airspace Management and Use.

Federal Airways. The Victor and Colored airways that transit through or adjacent to JPARC MOAs and lower restricted airspace altitudes (below FL180) are described in Chapter 3, Airspace Management and Use.

General Aviation Corridors. Several VFR corridors have been identified within the Fairbanks and Eielson Air Force Base (AFB) region for use by general aviation aircraft in transiting the MOA airspace that encompasses that area as shown in Figure B-1. These corridors are shown on the Special Use Airspace Information Service (SUAIS) brochure which is available at http://www.jber.af.mil/shared/media/document/AFD-120330-033.pdf. The following is a description of each corridor.

- ***Richardson Highway VFR Corridor North Segment.*** Runs from the north border of the Buffalo MOA to the convergence of Richardson Highway and the Delta River; from 2 NM east of the highway to 0.5 NM west of the highway or pipeline, whichever is farther west; and from the surface to 3,500 feet MSL.
- ***Richardson Highway VFR Corridor South Segment.*** Runs from the convergence of Richardson Highway and Delta River to the southern Buffalo MOA Border from 0.5 NM east of the highway to the west side of the Delta River; and from the surface to 3,500 feet MSL.
- ***Alaska Highway VFR Corridor.*** Runs from 2 NM north of the highway to 2 NM south of the highway, and from the surface to 3,000 feet MSL.
- ***Birch VFR Corridor.*** Runs from 0.5 NM north of the Alaska Highway to the south side of the Tanana River, and from the surface to 3,000 feet MSL.

Public Airports and Private Airfields. Appendix D, *Airspace*, includes a description and depiction of the public and charted private airfields within the region of the proposed airspace actions that service the large general aviation community in this region. The appendix descriptions note the most recent available information on annual airfield operations for each. Air travel can be the most practical means of transport for remote areas in Alaska. Fire management services use airspace to gain quick access and to stage operations when fighting fires in remote areas, particularly where small communities border on uninhabited forested land. Emergency transport operations use airspace for the medical evacuation of patients from remote areas to regional medical centers. Rapid delivery of machinery parts and personnel can be critical during harvesting periods or other industrial operations. During scoping meetings, private and commercial pilots have described aviation as a primary means of transportation and access throughout Alaska. Often pilots fly without local or regional radio contact, and much of the area in which they fly has limited radio or radar tracking.

Air traffic control services within this region are provided by FAA facilities in Anchorage and Fairbanks. The Anchorage Air Route Traffic Control Center (ARTCC) is responsible for domestic and international flights transiting throughout Alaska as well as being the controlling agency for the SUA. The Anchorage ARTCC provides approach and departure services for Allen Army Airfield (AAF). The Anchorage Terminal Radar Approach Control (TRACON) provides ATC approach and departure services for the Anchorage International Airport, Joint Base Elmendorf-Richardson (JBER), and Bryant AAF (JBER). The JBER control tower is responsible for air traffic operations within the Class D airspace surrounding this airfield. The Fairbanks TRACON provides ATC approach and departure services to the Fairbanks International Airport, as well as military aircraft operating out of Eielson AFB and Ladd AAF (Fort Wainwright). The Eielson AFB control tower is responsible for airfield operations within Class D airspace surrounding this airfield.

B.2 NOISE

B.2.1 Definition of Resource

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise has the potential to impact several environmental resource areas. This noise section will describe baseline noise conditions and noise effects on human annoyance, health, and structures. Noise impacts on biological, land use, socioeconomics, and cultural resources are discussed in separate sections dealing with those environmental resources. The region of influence (ROI) for noise consists of lands beneath current and proposed airspace that would be affected by changing levels of aircraft and munitions noise.

Noise can be of several different types, each of which has its own characteristics. Continuous noise sources include machinery, such as an air-conditioning unit. Transient noise sources are those which move through the environment, either along established paths (e.g., highways or railroads) or randomly (e.g., training in an MOA). Some noise sources are impulsive (e.g., thunder clap or sonic boom). The response of a receptor (e.g., person, animal, or structure) to a noise depends on the characteristics of the noise itself, as well as the sensitivity of the receptor at the time the noise is heard.

The physical characteristics of noise, or sound, include its *intensity*, *frequency*, and *duration*.

Intensity. Sound consists of minute pressure waves that travel from the sound source to the ear. These waves can be compared to ripples spreading outward from a stone dropped in still water. Larger waves are interpreted by the ear as more-intense sounds. Sound intensities are expressed using the logarithmic unit, the decibel (dB). Using the dB scale, a sound level that is 3 dB louder than another will be perceived as being noticeably louder, while a sound that is 10 dB higher than another will be perceived as twice as loud. A whisper is typically 20 dB or lower, while a thunderclap can be 120 dB or louder.

Frequency. The frequency of a sound, as measured with the unit hertz (Hz), is the number of sound waves that pass a point in a second. A person with healthy hearing can detect sounds ranging from 20 to 15,000 Hz but detects sounds in the middle frequencies of this range most strongly. Sound measurements are refined using "A-weighting," which emphasizes frequencies best heard by the human ear. In this EIS, dBs are A-weighted unless otherwise noted. For impulsive sounds (e.g., sonic booms, thunder, clapping), which have the potential to induce vibrations in objects, either the "C-weighting" scale or un-weighted dB noise levels are used. The C-weighting scale does not de-emphasize high- and low-frequency sounds to the extent that A-weighting does. Impulsive noise peak decibel noise levels (dBP) are not frequency weighted (Figure B-2).

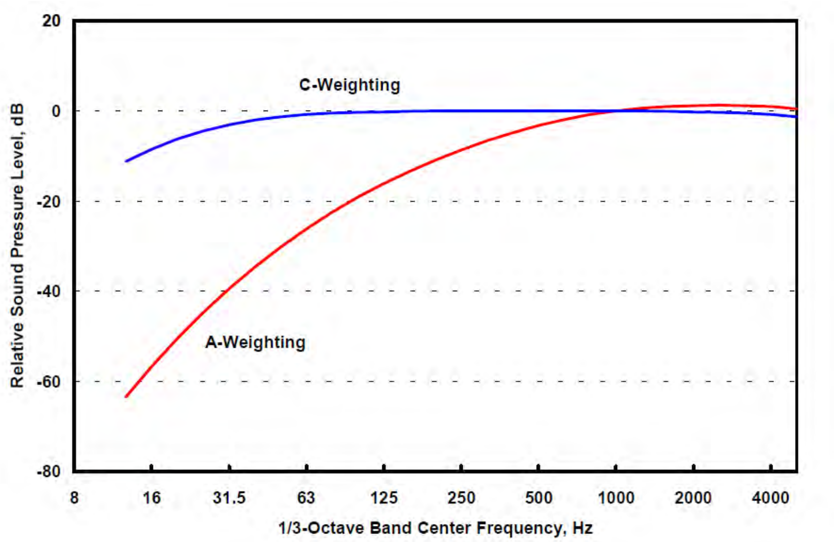

Figure B-2. A-Weighting and C-Weighting Scales
Source: Wyle Laboratories 2001

Duration. The duration of a noise event is the time between the point at which the sound is initially heard and the point at which it is no longer being heard. From the ground, the sound level of an aircraft flying overhead changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance.

Noise analysts use several "metrics" to describe complex and variable sets of noise events. These metrics are designed to represent noise in such a way that noise impacts can be predicted and interpreted. Noise metrics used in this analysis include the following:

$\mathbf{L_{max}}$ [Maximum Sound Level] is the highest sound level measured during an event, such as a single aircraft overflight.

SEL [Sound Exposure Level] accounts for the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the total sound exposure for an entire event. For many types of noise impacts, SEL provides a better measure of intrusiveness of the sound than L_{max}. When military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. This rapid onset rate carries a "surprise" effect that can make noise seem louder than its measured SEL would suggest. The calculation for SEL_r [Onset Rate-Adjusted Sound Exposure Level] has an additional noise penalty programmed into the calculation of up to 11 dB to account for this effect.

DNL [Day-Night Average Sound Level], mathematically denoted as L_{dn}, is a noise metric combining the levels and durations of noise events and the number of events over a 24-hour period. DNL also accounts for more-intrusive nighttime noise, adding a 10-dB penalty for sounds after 10 p.m. and before 7 a.m. The FAA has determined that DNL is the appropriate measure to account for total noise exposure around airfields and airports. Depending on the regularity of operations, DNL is computed either as an annual average or for operations representing an average busy day.

L_{dnmr} [Onset Rate-Adjusted Day-Night Average Sound Level], is the measure used for subsonic aircraft noise in such training airspace as MOAs and MTRs. L_{dnmr} accounts for the surprise effect on humans of aircraft overflights and the sudden onset of the aircraft noise event. The penalty ranges from 0 to 11 dB and is added to the normal SEL based on the altitude and airspeed of an approaching aircraft. **L_{dnmr}** is computed for the busiest month of the year to account for the variation in the seasonal use of some airspace areas. **L_{dnmr}** is interpreted by the same criteria as used for DNL.

CDNL [C-Weighted Day-Night Average Sound Level] is a day-night average sound level computed for areas subject to impulsive noise such as sonic booms. Areas subjected to supersonic noise are typically also subjected to subsonic noise, which is assessed based on the L_{dnmr} metric.

L_{pk} [peak noise level] is used to characterize the strength of impulsive noise such as sonic boom peak overpressure in pounds per square foot (psf). A decibel version of this, L_{pk}, is used when relating boom amplitude to human or animal response, although the direct physical pressure is most commonly used when assessing effects on structures. Because peak noise levels are influenced strongly by variable meteorological conditions, peak noise levels are generally specified as the level not exceeded for a certain percentage of the time. For example, noise generated by a certain munitions type may exceed 115 dBP at a certain location only in the 15 percent of days with most unfavorable meteorological conditions. The abbreviated version of the metric used to describe this situation is PK 15(met).

B.2.2 Regulatory Setting

The FAA has special expertise and authority in the area of aviation-related noise (e.g., 49 U.S.C. 47501–47507, Aviation Safety and Noise Abatement Act of 1979, as amended; 49 U.S.C. 44715, Noise Control Act of 1972). FAA Order 1050.1E, Section 14, available online at www.faa.gov, describes policies and procedures for assessing noise impacts of FAA actions, including approval of SUA, which are subject to NEPA. DNL is the FAA's primary metric for establishing the cumulative exposure of individuals to noise resulting from aviation activities. The FAA has defined a significant noise impact as one that would occur if analysis shows that the proposed action will cause noise-sensitive areas to experience an increase in noise of 1.5 dB DNL or more at or above 65 dB DNL noise exposure when compared to the No Action Alternative for the same timeframe. For example, the FAA would consider an increase from 63.5 dB DNL to 65 dB DNL a significant impact. The FAA’s Office of Environment and Energy has approved the DoD computer models MRNMAP, PC BOOM, and BOOMAP for use in this noise analysis related to SUA.

The Air Force and Army seek to minimize impacts or annoyance of unwanted noise on communities surrounding installations and training areas and on those underlying training airspace. Programs established to minimize incompatibility between military training noise and adjacent communities are described very briefly below.

The Air Force’s Air Installation Community Use Zone Program, described in AFI 32-7063 (Air Force 2005), establishes recommended time-averaged noise levels (i.e., DNL not to be exceeded) that are generally considered compatible with various land uses. This Air Force program considers residences and other noise-sensitive land uses to be compatible at noise levels less than 65 dB DNL.

The Army's Environmental Noise Management Program (ENMP), described in AR 200-1, establishes noise zones within which noise-sensitive land uses are not recommended (Army 2007b). In noise Zone II, noise-sensitive land uses are not recommended unless special measures are taken to reduce interior noise levels and, in noise Zone III, noise-sensitive land uses are never considered to be compatible (Table B–3). Loud individual noise events generated by large-caliber weapons have the potential to trigger annoyance. The likelihood of complaints being triggered by individual peak noise events of various levels is described in Table B–4. Noise-sensitive land uses are normally not recommended in locations exposed to between 115 and 130 dB Pk 15(met) and are never recommended at noise levels exceeding 130 dB Pk 15(met).

Table B–3. Noise Limits for Noise Zones

Noise Zone	Noise Limits		
	Aviation in dB DNL	Impulsive in dB CDNL	Small Arms in dBP PK 15(met)
I	<65	<62	<87
II	65–75	62–70	87–104
III	>75	>70	>104

Key: CDNL=C-weighted day-night average sound level; DNL=day-night average sound level; PK 15(met)=single event peak level exceeded by 15 percent of events.
Source: Adapted from Army 2007b (AR 200-1).

Table B–4. Risk of Noise Complaints by Level of Noise

Risk of Noise Complaints	Large Caliber Weapons Noise Level in dBP PK 15(met)
Low	<115
Medium	115–130
High	130–140
Risk of physiological damage to unprotected human ears and structural damage claims	>140

Key: PK 15(met)=single event peak level exceeded by 15 percent of events.
Source: Adapted from Army 2007b (AR 200-1).

Military weapons or equipment designed for combat use are exempt from the requirements of the Noise Control Act of 1972 (42 U.S.C. § 4902). However, construction equipment and other types of noncombat equipment are subject to noise-related guidelines as established in the Act.

B.2.3 General Description of Affected Environment

B.2.3.1 Existing Subsonic Noise Environment in JPARC SUA

Within MOAs and restricted airspace, subsonic training is dispersed and often occurs randomly. The Air Force has developed the MR_NMAP [MOA-Range NOISEMAP] computer program (Lucas and Calamia 1996) to calculate subsonic aircraft noise in these areas. These computer programs calculate projected noise based on aircraft type, flight characteristics, meteorological conditions, and training activities. The models are based on data collected under military airspace and represent the best data available for environmental evaluation. The model results are supported by measurements in several military airspace areas (Lucas et al. 1995). Noise levels (L_{dnmr}) in JPARC SUA are listed in Table B–5.

Ambient noise levels (i.e., noise levels when no military training activities are under way) have not been measured, but are expected to be in the range of 22 to 44 dB based on the findings of studies conducted in

similar environments (Miller 2002, ANG 1997). For the purposes of this study, the ambient noise level in unpopulated portions of the ROI is assumed to be 35 dB DNL_{mr}. Aircraft noise levels that are less than ambient noise levels have a relatively minor effect on the overall noise environment and are listed in Table B–6 as "<35."

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL and L_{dnmr}. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any specific individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance with aircraft noise is represented quite reliably using DNL. A study by Schultz (1978) showed a consistent relationship between noise levels and annoyance. A more recent study (Fidell et al. 1991) reaffirmed and updated this relationship. The likelihood of annoyance is also predicted by impulsive noise levels, which are described by the metric CDNL. The relationship between DNL, CDNL, and annoyance is shown in Table B–6. Additional discussion of impulse noise levels can be found in Sections B.2.3.2 and B.2.3.4.

Table B–5. Average Noise Levels in JPARC SUA

Special Use Airspace Name	Noise Level (dB L_{dnmr})
Birch MOA	61
Blair ATCAA	<35
Buffalo MOA	55
Delta MOA/ATCAA	40
Eielson MOA/ATCAA	59
Fox 1 MOA/ATCAA	44
Fox 2 MOA/ATCAA	52
Fox 3 MOA/ATCAA	39
Paxon ATCAA	37
R-2202	55
R-2205	60
R-2211	66
Viper A MOA	47
Viper B MOA/ATCAA	47
Yukon 1 MOA/ATCAA	50
Yukon 2 MOA/ATCAA	49
Yukon 3A Low/High MOA/ATCAA	56
Yukon 3B MOA/ATCAA	44
Yukon 4 MOA/ATCAA	47
Yukon 5 MOA/ATCAA	<35

Note: Calculated using MRNMAP (Lucas and Calamia 1996)

Key: ATCAA=Air Traffic Control Assigned Airspace; dB=decibel; L_{dnmr}=onset rate-adjusted day-night average sound level; MOA=Military Operations Area; SUA=Special Use Airspace.

Table B–6. Percentage of Population Highly Annoyed by Elevated Noise Levels

L_{dnmr} (dB)	CDNL(dB)	Average Percentage of Highly Annoyed Population
55	52	3.3
60	57	6.5
65	61	12.3
70	65	22.1
75	69	36.5

Key: CDNL=C-weighted day-night average sound level; dB=decibel;; L_{dnmr}=onset rate-adjusted day-night average sound level.

Source: CHABA 1981, Fidell et al. 1991, Schultz 1978, Stusnick et al. 1992.

L_{dnmr} provides a total noise exposure, but may not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be; MR_NMAP and its supporting programs can provide the maximum sound level (L_{max}) and sound exposure level (SEL) that accounts for both the duration and the intensity of a noise event for individual aircraft at various distances and altitudes. Table B–7 presents L_{max} for aircraft typically using JPARC. Table B–8 presents SEL values for representative aircraft at various altitudes. L_{max} indicates the maximum noise level that would be heard by an individual as the aircraft flies overhead. SELs reflect the complete noise exposure as an aircraft flies by, accounting for both the level and duration of the sound.

Table B–7. Representative A-Weighted Instantaneous Maximum Sound Level in Decibels under the Flight Track for Aircraft at Various Altitudes[1]

Aircraft Type	Airspeed (knots)	Power Setting[2]	300 AGL	500 AGL	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL	20,000 AGL
F-15C	520	81% NC	119	114	107	99	86	74	57
F-15E[3]	450	81 % NC	104	99	92	85	73	64	52
F-22	450	70% ETR	120	115	108	100	88	78	66
F-16C[3]	450	89% NC	115	110	102	95	83	73	60
F-18A	500	92% NC	120	116	108	99	85	71	54
B-1B	550	101% RPM	117	112	106	98	86	75	61
C-17	230	86 %NC	101	96	87	77	63	52	40
C-130J	235	530 MGT	101	96	88	80	68	57	46
KC-135R	300	89.6 %NF	N/A	N/A	N/A	N/A	N/A	59	47
Single-Engine, Variable-pitch Propeller-Driven Aircraft (generic)	160	70 %RPM	81	77	70	63	54	45	36

1 Level flight, steady, high-speed conditions. Standard acoustic atmospheric conditions used.
2 Engine power setting while in an MOA. The type of engine and aircraft determines the power setting.
3 Aircraft equipped with PW-229 engines.

Key: AGL=above ground level; ETR=engine thrust request; NC=percent core; MGT = Measured Gas Temperature; RPM=rotations per minute; NF = fan speed.

Table B–8. Sound Exposure Level in Decibels under the Flight Track for Aircraft at Various Altitudes[1]

Aircraft Type	Airspeed (knots)	300 AGL	500 AGL	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL	20,000 AGL
F-15C	520	116	112	107	101	91	80	65
F-15E[3]	450	107	103	98	92	84	76	66
F-22	450	120	116	111	105	95	86.4	76
F-16C[3]	450	116	112	106	100	91	83	72
F-18A	500	118	114	108	101	89	77	62
B-1B	550	116	112	107	101	92	82	70
C-17	230	103	99	92	84	72	63	53
C-130J	235	104	100	94	88	78	69	60
KC-135R	300	N/A	N/A	N/A	N/A	N/A	70	60
Single-Engine, Variable-pitch Propeller-Driven Aircraft (generic)	160	87	84	79	74	67	61	53

1 Level flight, steady, high-speed conditions. Standard acoustic atmospheric conditions used.
2 Projected based on F-22 composite aircraft.
3 Aircraft equipped with PW-229 engines.
Key: AGL=above ground level.

B.2.3.2 Existing Supersonic Noise

Supersonic flight is primarily associated with air combat training. Supersonic activity is authorized in the Yukon and Fox, MOAs and their overlying ATCAAs, as well as Delta ATCAA and R-2202. Supersonic flight produces an air pressure wave that may reach the ground as a sonic boom. The amplitude of an individual sonic boom is measured by its peak overpressure (in psf) and depends on an aircraft's size, weight, geometry, Mach number, and flight altitude. Table B–9, shows sonic boom overpressures for F-15C, F-16, F-18, and F-22 aircraft in level flight at various altitudes. The biggest single condition affecting overpressure is altitude. Maneuvers can also affect boom peak overpressures, increasing or decreasing overpressures from those shown in Table B–9.

Table B–9. Sonic Boom Peak Overpressures for Aircraft at Mach 1.2 Level Flight (in pounds per square foot)

Aircraft	Altitude (feet)			
	10,000	20,000	30,000	40,000
F-15C	5.40	2.87	1.90	1.46
F-16	4.4	2.3	1.5	1.2
F-18	5.0	2.7	1.7	1.3
F-22	5.68	3.00	1.97	1.50

Source: Air Force 2006b.

Community effects from sonic booms, in the form of annoyance, correlate well with CDNL (CHABA 1981). CDNL and DNL, however, are subject to different interpretations. A given numerical value of CDNL generally represents more annoyance than the same numerical value of DNL (see Table B–6). The number of sonic booms per day and time-averaged supersonic noise level (CDNL) are presented in Table B–10 for each of the JPARC SUAs in which supersonic flight is permitted. Noise

levels presented are the highest levels experienced in areas near the center of airspace unit. In areas not near the center of the airspace areas, noise levels would be lower.

Table B–10. Supersonic Noise Levels in JPARC SUAs

Special Use Airspace Name	Noise Level (dB CDNL)	Booms Per Day
Fox 1 MOA/ATCAA	56	1.7
Fox 2 MOA	56	1.7
Fox 3 MOA/ATCAA	61	4.6
Yukon 1 MOA/ATCAA	53	0.7
Yukon 2 MOA/ATCAA	52	0.6
Yukon 3A Low/High MOA	52	0.6
Yukon 3B MOA	51	0.5
Yukon 4 MOA/ATCAA	52	0.6
Yukon 5 MOA/ATCAA	51	0.5
Delta ATCAA	39	<0.1
R-2202	53	0.8

Note: As reported for FY 2010.
Key: ATCAA=Air Traffic Control Assigned Airspace; CDNL=C-weighted day-night average sound level; dB=decibel; MOA=Military Operations Area; SUA = Special Use Airspace.

Aircraft exceeding Mach 1 always create a sonic boom, although not all supersonic flight activities will cause a boom at the ground. As altitude increases, air temperature decreases, and the resulting layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as "cutoff," acts to limit the width (area covered) of the sonic booms that reach the ground (Plotkin et al. 1989).

When a sonic boom reaches the ground, it impacts an area that is referred to as a "footprint" or (for sustained supersonic flight) a "carpet." The size of the footprint depends on the supersonic flight path and on atmospheric conditions. Sonic booms are loudest near the center of the footprint, with a sharp "bang-bang" sound. Near the edges, they are weak and have a rumbling sound like distant thunder.

Sonic booms from air combat training activity have an elliptical pattern. Aircraft will set up at positions in excess of 100 NM apart before proceeding toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft will fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement.

A variety of aircraft conducting training perform flight activities that include supersonic events. For most aircraft, these events occur during air-to-air combat, often at high altitudes. Long-term sonic boom measurement projects have been conducted in four airspaces: White Sands, New Mexico (Plotkin et al. 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin et al. 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton et al. 1993); and the western portion of the Goldwater Range, Arizona (Page et al. 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data, and they supported development of the 1992 BOOMAP model (Plotkin et al. 1992). The current version of BOOMAP (Frampton et al. 1993; Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for maneuvers, statistical variations in operations, atmospheric effects, and other factors.

B.2.3.3 Airports and Military Airfields

Noise around the primary military and civilian airfields in the affected area is typically dominated by aircraft noise. Civilian aircraft operating in the region are predominantly small propeller-driven aircraft. Jet aircraft are generally limited to larger airfields, such as the Fairbanks International Airport. Military aircraft include fourth and fifth generation fighter aircraft, fixed-wing cargo and attack aircraft, and rotary-wing aircraft.

B.2.3.4 Training Areas and Firing Ranges

Noise levels associated with large munitions training (i.e., 20 mm rounds and larger) under representative baseline conditions were calculated using the BNOISE2 program (Hottman et al. 1986). Determination of noise generated by vehicles in the training ranges was based on field measurements, as reported in the 2004 EIS for Transformation of U.S. Army Alaska (USARAK 2004). Ground vehicle noise is less intense than munitions noise, which occurs in the same areas, and was not considered in detail (see Table 3-106 and the table in Appendix E, *Noise*, entitled "Peak Noise Level Associated With Munitions Noise Events").

Fort Wainwright and the Tanana Flats Training Area. Fort Wainwright (FWA) and the Tanana Flats Training Area (TFTA) were calculated as part of a *2006 Joint Land Use Study* (ASCG Incorporated of Alaska [ASCG] 2006). Air-to-ground and ground-to-ground munitions use in the Blair Lakes Impact Area is limited to inert munitions. Other noise sources at FWA and in TFTA include military vehicle maneuvers.

Donnelly Training Area. The Oklahoma Impact area in the Donnelly Training Area (DTA) is a primary location for air-to-ground and ground-to-ground high-explosives munitions training in the JPARC. Peak noise levels (PK 15(met)) generated by the largest of the high-explosives munitions used in the DTA under representative baseline conditions exceed 115 dBP PK 15(met) in areas outside range boundaries. Persons in areas affected by these high-intensity noise events may be startled or annoyed by the noise. Time-averaged noise levels exceeding 62 CDNL and peak noise levels exceeding 130 dBP PK 15(met) do not occur in areas outside of the boundaries of the range (see Figures 3-20 and 3-21).

Yukon Training Area. Air-to-ground and ground-to-ground munitions training occurs in the Yukon Training Area (YTA), but neither time-averaged noise levels exceeding 62 dB CDNL nor peak noise levels exceeding 115 dBP PK 15(met) extend beyond the boundaries of DoD-owned land (see Figures 3-33 and 3-34).

Other Noise Sources. Noise is also caused by vehicles and equipment, either on a regular, intermittent, or temporary basis, within both military lands and public and private lands. Noise sources are generally more prevalent in built-up areas, at construction sites, or industrial areas or production sites (e.g., oil and gas wells). Vehicles, snowmobiles, and all-terrain vehicles (ATVs) also generate noise, mostly dispersed and intermittent throughout the area comprising JPARC air and land assets.

B.2.3.5 Noise Management and Noise-Sensitive Areas

For areas not in the vicinity of airfields, special consideration is given to the evaluation of noise impacts on noise-sensitive areas such as national parks, national wildlife refuges, and historic sites, including traditional cultural properties. An area is defined by the FAA as noise-sensitive if noise interferes with normal activities associated with the area's use. Examples of noise-sensitive areas include residential, educational, health, and religious structures and sites, as well as parks, recreation areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historic sites where a quiet setting is a generally recognized feature or attribute.

Direct negative effects of noise in noise-sensitive areas are variable, ranging from health effects or annoyance in persons (e.g., interference with communication or sleep) to measureable population declines in animals (particularly mammals during critical life stages such as calving and breeding). Indirectly, this can translate into changes in the suitability or desirability of an area for ongoing or planned uses, a degrading of the value of an area, or a reduction or loss of important biological resources.

From the military planning perspective, sources of noise are usually from aircraft, particularly around airfields, and from low-flying (and usually high-speed) aircraft in military training airspace. Variables include the type of aircraft, altitude, speed, and power level. Incompatibility is relative to the context, that is, the surrounding noise environment, the type of land use, and people's expectations. Another source of noise is from firing ranges, where impulsive noise can produce loud individual sound levels, depending on the distance to the receptor and the types of weapons and munitions fired.

Achieving sustainable compatibility between military operations and the surrounding environment can depend on the use of selected measures to attenuate or reduce noise. Typical abatement measures include the following:

- Avoidance of receptor by specified vertical and lateral distances
- Adjustments to operations such as power levels and hours of operation
- Land buffering (using land to maintain distance between noise source and receptor)
- Selective alignment of flight tracks, patterns, and approach axes to limit exposure to sensitive areas
- Noise deflection (through sound barriers, deflectors, or berms)
- Use of vegetation (natural or planted) or sound-absorbing materials

Defining noise-sensitive areas is a collaborative process focused at identifying locations of affected resources or persons, the degree of sensitivity, and particular concerns (e.g., seasonal or daily variations in sensitivity). Identifying some of these areas up front when planning new airspace and land assets allows the proponent to anticipate and address limitations and likely public opposition early in the process. For the purpose of broad-scale evaluation, the following are considered noise-sensitive areas:

- Urban or developed areas
- Native villages
- Subsistence resource areas (pending acquisition of data on locations)
- Isolated dwellings/homesteads (identified through flyovers and aerial photography)
- Sensitive habitats (e.g., moose, caribou, and Dall sheep rutting, calving, and wintering areas)
- Waterfowl nesting and molting areas (seasons)
- Eagle and other raptor nests
- Wilderness areas/Wild and Scenic Rivers
- National parks/monuments
- Special recreation areas (data incomplete)
- National/state wildlife/bird refuges, conservation areas, and management areas

Figure B-3 shows noise-sensitive areas in the EIS study area. The locations and degree of sensitivity are subject to review and refinement and are only useful at a preliminary planning or screening level. Residential areas, communities, national parks, and other managed areas are continuous in their sensitivity, although some areas may have specific conditions that are seasonal. Biological constraints tend to be seasonal or dependent on the reproductive cycle.

National parks, which have explicit overflight altitude restrictions, are typical of Federally protected, thus noise-sensitive, regions within the study area. Bureau of Land Management (BLM) conservation areas underlie the Yukon MOA complex, Denali National Park underlies part of the Susitna MOA, and several Wild and Scenic River corridors lie to the east of the Fox MOAs. Furthermore, several Alaska Native villages are arrayed along the west and north fringes of the planning area, though few are in the environs of existing military airspace. Mixed developed land use and residential populations around Fairbanks, Anchorage, Wasilla, Palmer, and Delta Junction and along the U.S. Highway 3 corridor also have varying degrees of sensitivity to noise.

B.3 SAFETY

B.3.1 Definition of Resource

Safety refers to the aspects of military training activities that potentially pose a risk to health, safety, and well-being of the general public and military personnel. The following types of safety risks are considered in the EIS.

Flight safety considers aircraft flight risks, including the risks of accidents and mishaps from various causes (e.g., malfunction, bird-aircraft collision), midair collision, and interruption of airborne emergency services. Of particular concern is the safe interface between military and nonparticipating aircraft in SUA areas and uncontrolled airspace.

Ground safety considers potential to pose hazards to the general public and military personnel. The scope of ground safety includes safety and control, unexploded ordnance (UXO) and munitions safety, public access control, and fires and emergency response.

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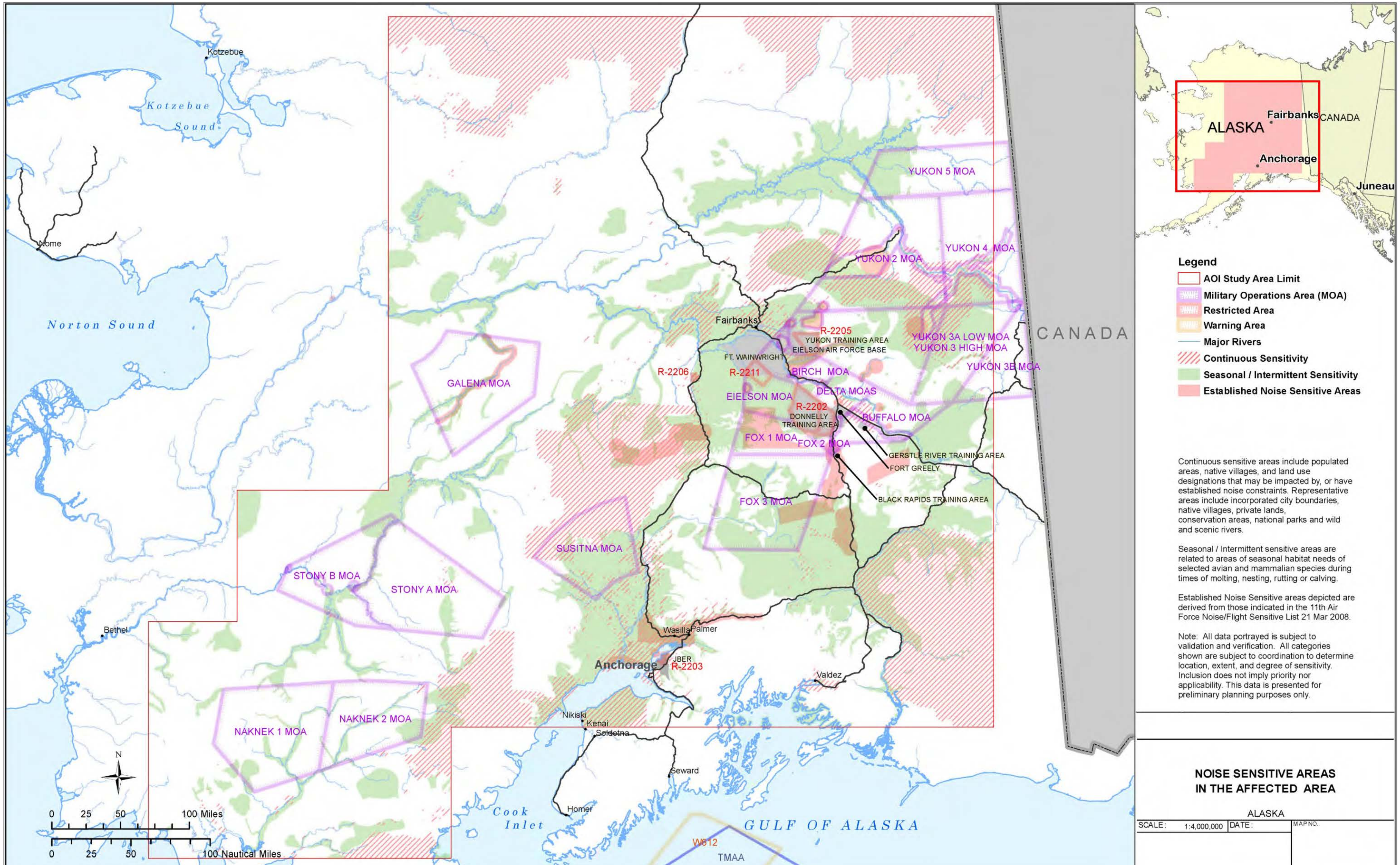

Figure B-3. Noise Sensitive Areas in the Affected Area

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B.3.2 Regulatory Setting

B.3.2.1 Flight Safety

Safety of flight is the core basis for all programs, procedures, and practices that govern how an aircraft is operated in any airspace environment under all flight conditions. It also constitutes one of the greatest areas of concern when any new action or activity is being considered that could be viewed as having a consequential effect on aviation activities within that environment. Given its critical importance, the FAA, DoD, and other agencies have established and mandated strict adherence to rules and regulations aimed at ensuring a safe operational environment is maintained for all airspace users.

The regulatory setting for safety compliance in Alaska includes AFI 91-202, *The US Air Force Mishap Prevention Program* (Air Force 2011a), AR 95-1, *Aviation Flight Regulations* (Army 2008a), and the respective 11th AF and USARAK supplements to those directives. These directives prescribe general flight regulations, requirements, and operating procedures governing the command, control, and operation of flight activities within Alaska. Aircrew members continually receive extensive training and safety briefings on these requirements.

Most public scoping concerns centered on the potential for aircraft mishaps, inadequate communications capabilities for staying informed on SUA use, and safety risks from low-altitude, high-speed flight activities. The aforementioned directives and other safety program initiatives provide the regulatory framework for those actions the Air Force and Army must take in preventing any unsafe conditions that can contribute to such public concerns.

B.3.2.2 Ground Safety

This section provides an overview of the ground safety resource area.

B.3.2.2.1 Range Safety and Control

Range Safety and Control addresses established procedures designed to minimize potential safety impacts to military personnel and the general public. Range safety and control is the responsibility of the USARAK Range Management Office (RMO). All training activities must be coordinated in advance through the RMO. During training activities, the RMO Office clears the affected training area by closing range gates and blocking passable trails. The airspace to be utilized is also surveyed visually and electronically to ensure that unauthorized aircraft or vehicles are not in the affected area during training. If any unauthorized personnel, vehicles, or aircraft are detected, the training activity is temporarily halted until the area is cleared and secured.

A key part of these procedures includes development of weapon safety footprints, also referred to as surface danger zones (SDZs) by the Army. SDZs are employed for land-based training where live ordnance is used. These SDZs act as overlays that restrict activities that could normally occur within and adjacent to test or training areas. If any unauthorized personnel or vehicles are detected within the area during training, all activity is temporarily halted until the area is cleared and secured.

B.3.2.2.2 Unexploded Ordnance and Munitions Safety

The potential exists to find UXO within JPARC range lands from historic training activities. These include impact areas and SDZs where ordnance might have been deliberately employed or accidentally dropped, or where ordnance might have landed after ricocheting. UXO could pose a danger to personnel when they enter potentially hazardous areas to set up targets or instrumentation in support of training activities. UXO may also be encountered during range or road construction activities.

JPARC has strict safety policies and procedures in place to minimize the risk posed by UXO to personnel. As necessary, at the earliest time after the project planning phase, personnel perform a UXO site survey to determine the extent of the ordnance contamination to aid in the design of the range and minimize intrusive work in portions of the range which are highly contaminated with ordnance and to determine the correct ordnance response actions (USARAK 2010). If UXO contamination is encountered during construction or training activities, work within the immediate area ceases and Range Control notifies the appropriate Explosive Ordnance Disposal (EOD) team.

Current practices require the ranges to be cleared of munitions debris on a regular basis. Equipment such as metal detectors, robots, and protective "bomb suits" may be employed to find and deal with UXOs. Once a potentially dangerous item is found, EOD personnel may remove the item to another location for disposal or may destroy the item in-place (a small amount of plastic explosive is placed next to the item and detonated from a safe distance). EOD will then verify that no dangerous components remain on the range.

These procedures are designed to limit, to the extent practical, the potential for explosives mishaps and the damaging effects of such to personnel, operational capability, property, and the environment and to enhance the ability to prevent or respond to a release or substantial threat of a release of munitions constituents from an operational range to off-range areas.

B.3.2.2.3 Public Access and Control

A number of standard safety procedures exist on JPARC ranges to ensure limited public access to affected areas during training activities. These procedures require every practical effort to keep the designated areas clear of all nonparticipating vehicles and personnel. These procedures may include roadblocks, as well as notifications to the public, by newspaper or other means, of potential training activities and road closures.

Public access into training areas is allowed subject to safety restrictions and military security, when access does not impair the military mission, as determined by the Installation Commander. Public access into firing ranges, surface danger zones, and non-dudded impact areas is normally not allowed due to conflicts with the military mission. However, there are times during the year when public use does not conflict with military training and public access is allowed into these areas. Finally, public access into dudded impact areas is prohibited because of the hazard of unexploded ordnance (USARAK 2010).

B.3.2.2.4 Fires and Emergency Response

Wildfire management on USARAK lands is required by the Sikes Act and AR 200-1, as well as Public Law 106-65, the Military Lands Withdrawal Act. Additional direction regarding fire management comes from USARAK's Integrated Wildland Fire Management Plan (IWFMP) and the Memorandum of Understanding between BLM and USARAK concerning the Management of Certain Public Lands Withdrawn for Military Use and the Interdepartmental Support Agreements WC1SH3-95089-502 and 140138-95089-905 between USARAK and BLM. The IWFMP directly supports USARAK missions, is consistent with emergency operations plans, and is integrated into the Integrated Natural Resource Management Plan (INRMP), the USARAK's fire and emergency services plan, and the Integrated Cultural Resource Management Plan (ICRMP). The goal of the IWFMP is to establish fire management procedures and protocols to provide USARAK the capability to complete its mission to maintain combat readiness and fulfill resource management intent (USARAK 2010).

Three primary management actions are used by USARAK to prevent wildfires. First, a fire danger rating system is used to reduce the likelihood of a fire by limiting military activities. Certain military activities are restricted when thresholds of wildfire risk are reached, such as limiting or eliminating the use of

pyrotechnic devices or ordnance during periods of high fire potential. During dry periods, specific targets and ranges with a high fire risk are continuously evaluated for the safety of planned operations. Second, wildfire danger is reduced through the removal of accumulated fuels (e.g., prescribed burning and/or construction and maintenance of fire or fuel breaks). Third, an Initial Attack Response Team remains available during military training activities during high and extreme fire danger to provide a rapid initial response to wildfires in the area (USARAK 2010).

B.3.3 General Description of Affected Environment

B.3.3.1 Flight Safety

B.3.3.1.1 Aircraft Mishaps

The increased potential for aircraft mishaps was one of the primary concerns expressed during public scoping. Both military and civilian aircraft mishaps may be caused by such conditions as inclement weather, mechanical failure, pilot error, collisions with other aircraft, structures or terrain, and bird/wildlife strikes. Mishaps are categorized by the DoD Services as Class A, B, C, D, and E. The Army also tracks incidents involving aircraft turbine engine damage as Class F. Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, or destruction of an aircraft. Class B mishaps result in total costs of more than $500,000, but less than $2 million, or result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $50,000 but less than $500,000; an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. Class D mishaps are minor, up to less than $50,000 while a Class E is less than $2,000. A hazardous occurrence having a high potential for becoming a mishap is considered a High Accident Potential (HAP) event. Class C mishaps and HAP events are the most common occurrences, generally involving only minor damage and injuries while rarely affecting property or the public.

Class A mishap rates are calculated by the number of mishaps by aircraft type per 100,000 flying hours. This rate is based on historical data for mishaps at all military installations and under all flight conditions but does not include combat losses resulting from enemy action. Tracking mishaps in this manner provides a general basis for statistical prediction, although the actual causes of mishaps are due to many factors, not simply the amount of aircraft flying time.

The JPARC airspace proposals address flight safety relative to the potential for aircraft mishaps, near-miss and midair collisions, and bird-aircraft strikes. The aircraft mishap potential considers what increases in aircraft operations may occur within the existing and proposed airspace compared to current representative levels. The potential for near-miss/midair collisions considers those areas where both higher density military and VFR civil air traffic operations and interactions may occur. The potential for bird-aircraft strikes considers those areas and altitudes where the different species are known to be present relative to the areas/altitudes where military aircraft typically operate. The presence of the different wildlife species are addressed in the Biological and Flight Safety discussions.

B.3.3.1.2 Communications Capabilities

The availability of radio and radar capabilities within the affected airspace region is a key element to providing for the flight safety of all aircraft. Where feasible, pilots can contact ATC and other agencies to receive advisories on SUA use and other traffic information, as well as radar flight following. It is recognized that current radio and radar capabilities in the more remote areas of Alaska and at some lower altitudes do not always provide the communications coverage needed for these advisory services. As part of the overall JPARC communication system, the Air Force has initiated projects to expand

communication within the airspace used for all training, including MFEs. These communication enhancements expand both radio and radar coverage in the existing airspace and those areas potentially affected by the proposed airspace actions. The Air Force is working with the FAA to provide enhanced radio coverage, which would benefit ATC services and airspace management for both military and civil aviation throughout those areas where military training activities are being conducted. Enhancements to both radio and radar coverage will improve both the military and FAA ability to communicate airspace activities and will improve safety, efficiency, and emergency coverage of the area.

B.3.3.1.3 Outreach Initiatives

The 11th AF and USARAK have been proactive in providing the civil aviation community with information on military use of the Alaska training airspace. One of the most successful initiatives is publication of the SUAIS brochure which is distributed in hard copy and electronically via the JBER website. This brochure serves both pilots and residents in providing information on where low-flying military aircraft and jet noise may occur. It also includes maps showing the layout of the SUA and those VFR corridors that general aviation aircraft may use to transit the MOA complex when this airspace is active. The primary function of the SUAIS is to provide civilian pilots with information regarding Air Force flight operations in the MOAs and restricted airspace within central Alaska so they may better plan their flights through and around the SUA. The service provides real-time information when these airspace areas are open during military flying windows. When these areas are inactive, or outside the flying windows, it provides information on the next day's schedule. The SUAIS also provides information on Army artillery firing and known helicopter operations. It provides telephone and radio frequency contact information for the Eielson Range Control facility where this real-time information can be obtained. As noted in the brochure, air evacuation, Life Flight, firefighting, and other emergency aircraft will always have priority over military training. The SUAIS brochure is provided for information purposes only and recommends that pilots contact the nearest Flight Service Station for the latest Notice to Airmen information on the SUA status. Contact information is also provided for filing noise complaints.

The 3rd Wing and the 354th Fighter Wing have each published a Mid-air Collision Avoidance (MACA) program to help inform the civil aviation community of the aircraft types and missions flown; the airspace areas used; flight procedures; and contacts for obtaining information on airspace status, reporting hazards, and requesting general information. These MACA pamphlets, along with the SUAIS brochure, are a valuable tool in communicating where, when, and how military flight training activities are conducted with the objective of helping to achieve the highest level of flight safety possible throughout the JPARC regions.

B.3.3.2 Wildlife Strike Hazard

Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to the aircrew or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 MSL or higher. However, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airport environment, and almost 55 percent occur during low-altitude flight training (AFSC 2010).

Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,000 to 2,500 feet AGL during migration.

In addition to waterfowl, raptors, shorebirds, gulls, songbirds, and other birds also pose a hazard. In considering severity, the results of bird-aircraft strikes in restricted areas show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-aircraft strikes. Raptors (eagles and hawks) and waterfowl pose a concern. Migration periods for waterfowl and raptors are from August to October and from April to May. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands). While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the years 1985 to 2009, the Air Force Bird-Aircraft Strike Hazard (BASH) Team documented 86,189 bird strikes worldwide. Of these, 31 resulted in Class A mishaps where the aircraft was destroyed, constituting approximately 0.04 percent of all reported bird-aircraft strikes (AFSC 2010).

Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace.

B.3.3.3 Ground Safety

B.3.3.3.1 Fire Management

The BLM Alaska Fire Service (AFS) located at Fort Wainwright, Alaska, provides wildland fire suppression services for all U.S. Department of the Interior (DOI) and Native Corporation Lands in Alaska. In addition to suppressing wildland fires, AFS has other statewide responsibilities, including: interpretation of fire management policy; oversight of the BLM Alaska Aviation program; planning, implementing, and monitoring fuels management projects; disposing of hazardous materials; and operating and maintaining advanced communication and computer systems such as the Alaska Lightning Detection System. AFS operates on an interagency basis - cooperators include the BLM, State of Alaska Department of Natural Resources, U.S. Forest Service (USFS), National Park Service (NPS), Bureau of Indian Affairs, U.S. Fish and Wildlife Service (USFWS), and the U.S. Military in Alaska.

Fire management in the DTA-East is set forth in Section 3.2.3 of the BAX/CACTF EIS (USARAK 2006a).

B.4 AIR QUALITY

B.4.1 Definition of Resource

Air quality is determined by the size and topography of the air basin, the local and regional meteorological influences, and the type and concentration of pollutants in the atmosphere, which are generally expressed in units of parts per million (ppm) or micrograms per cubic meter. One of the criteria for determining significance is a pollutant's measured concentration in comparison with a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare, while ensuring a reasonable margin of safety for the more sensitive individuals in the population.

B.4.2 Regulatory Setting

The Clean Air Act (CAA) (U.S.C. 42, Chapter 85, as amended in 1990) is the law that defines the responsibilities of the U.S. Environmental Protection Agency (EPA) for protecting and improving the nation's air quality and the ozone layer. National standards established by the EPA are termed the National Ambient Air Quality Standards (NAAQS). They represent the maximum acceptable concentrations that generally may not be exceeded more than once per year, except for the annual standards, which may never be exceeded. The CAA and its subsequent amendments delegate the enforcement of these standards to the states, which may adopt the NAAQS as state standards or establish more stringent acceptable pollutant concentration levels if they deem them necessary.

The Alaska Department of Environmental Conservation (ADEC) has adopted the NAAQS and has established additional state ambient air quality standards for purposes of regulating air quality in Alaska. The state standards are codified in Alaska Administrative Code (AAC), specifically, 18 AAC 50, *Air Quality Control* (ADEC 2011a). Table B–11 summarizes the national and state ambient air quality standards that apply to the areas potentially affected by the proposed actions in Alaska.

Ozone concentrations are the highest during the warmer months of the year and coincide with the period of maximum solar radiation. Maximum ozone concentrations tend to be homogeneously spread throughout a region, since it often takes several hours to convert precursor emissions to ozone in the atmosphere. Inert pollutants, such as carbon monoxide, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

National Emissions Standards for Hazardous Air Pollutants. EPA has set National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for emissions of hazardous air pollutants (HAPs) (also known as air toxics) not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness (40 CFR 61). EPA currently lists 188 compounds to be controlled as HAPs, most of which are volatile organic compounds (VOCs). The CAA, Section 112, requires the control of HAPs from specific area and major source categories. An area source is defined as a stationary source that emits less than 10 tons per year (tpy) of any single HAP and less than 25 tpy of all HAPs. A major source emits more than 10 tpy of any single HAP and over 25 tpy of all HAPs. In 1999, EPA provided further guidance as to which provisions, including NESHAPs, of the CAA are delegated to ADEC (EPA 1999a). Provisions of 40 CFR 61 applicable to ADEC are listed in 18 AAC 50 (ADEC 2011a).

Prevention of Significant Deterioration. Section 162 of the CAA established the goal of prevention of significant deterioration (PSD) of air quality in all international parks, national parks exceeding 6,000 acres in size, and national wilderness areas exceeding 5,000 acres (if these areas were in existence on or before August 7, 1977). Such areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the Federal government, have the authority to redesignate certain areas as (nonmandatory) PSD Class I areas, e.g., a national park or national wilderness area established after August 7, 1977, whose area exceeds 10,000 acres. Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. The PSD requirements affect construction of new major stationary sources in the Class I, II, and III areas; they are, in fact, a preconstruction permitting system. For example, a proposed action that would increase any pollutant level by more than 1 $\mu g/m^3$ within a Class I area would produce a significant amount of emissions, as defined in Section 40 CFR 52.21(b)(23)(iii) of the PSD regulation.

Table B–11. National and State Ambient Air Quality Standards

Pollutant	Averaging Time	Alaska AAQS	National AAQS Primary	National AAQS Secondary
Carbon Monoxide	8-hour[1]	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1-hour[1]	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide	Annual (arithmetic average)	53 ppb[2] (100 $\mu g/m^3$)	53 ppb[3] (100 $\mu g/m^3$)	Same as Primary
	1-hour[3]	None	100 ppb	None
Particulate Matter (PM_{10})	24-hour[4]	150 $\mu g/m^3$	150 $\mu g/m^3$	Same as Primary
Particulate Matter ($PM_{2.5}$)	Annual[5] (arithmetic average)	15.0 $\mu g/m^3$	15.0 $\mu g/m^3$	Same as Primary
	24-hour[6]	35 $\mu g/m^3$	35 $\mu g/m^3$	Same as Primary
Ozone	8-hour[7]	0.075 ppm	0.075 ppm (2008 std)	Same as Primary
	1-hour[8]	None	0.12 ppm	Same as Primary
Lead	Rolling 3-month average	0.15 $\mu g/m^3$ [9]	0.15 $\mu g/m^3$ [9]	Same as Primary
Sulfur Dioxide	Annual[10] (arithmetic average)	0.03 ppm (80.0 $\mu g/m^3$)	None	None
	24-hour[1, 10]	0.14 ppm (365 $\mu g/m^3$)	None	None
	3-hour	0.5 ppm 1300 $\mu g/m^3$ [11]	None	0.5 ppm (1300 $\mu g/m^3$)
	1-hour[10]	75 ppb[11]	75 ppb[12]	None
Reduced sulfur compounds measured as sulfur dioxide	30-minute[1]	50 $\mu g/m^3$	None	None
Ammonia	8-hour[1]	2.1 mg/m^3	None	None

1 Not to be exceeded more than once per year.
2 The official level of the annual nitrogen dioxide standard is 0.053 ppm, equal to 53 ppb.
3 To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
4 Not to be exceeded more than once per year on average over 3 years.
5 To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
6 To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3.
7 To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
8 (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than 1.
9 Final rule signed on October 15, 2008.
10 Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked on June 2, 2010 when the 1-hour standard was put into effect. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards.
11 30-minute average of 50 micrograms per cubic meter not to be exceeded more than once each year.
12 (a) Final rule signed on June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Key: AAQS=Ambient Air Quality Standards; EPA=Environmental Protection Agency; ppm=parts per million; ppb=parts per billion; mg/m^3=milligrams per cubic meter; $\mu g/m^3$=micrograms per cubic meter; $PM_{2.5}$=particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers; PM_{10}=particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; std=standard.

Source: EPA 2010a; ADEC 2011a.

Within the area potentially affected by the proposed actions, Denali Wilderness Area is the closest PSD Class I area. The border of the proposed Fox MOA expansion is approximately 15 miles from the Denali Wilderness Area. The remainder of the affected area is classified as PSD Class II, and has substantially less-stringent criteria for air quality than PSD Class I areas.

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a Class I area is typically associated with evaluation of stationary-source contributions. EPA implemented a Regional Haze rule for Class I areas that calls for states to establish goals and emission reduction strategies for improving visibility in all mandatory Class I national parks and wilderness areas, addressing contributions from mobile sources and pollution transported from other states or regions (EPA 1999b).

General Conformity. CAA Section 176(c), General Conformity Rule, requires that Federal agency actions be consistent with the CAA and any approved state implementation plan (SIP), which are required to help a nonattainment region achieve attainment of the NAAQS. To implement this mandate, EPA promulgated the General Conformity Rule for general Federal actions in the November 30, 1993 *Federal Register* (58 FR 63214–63259), effective January 31, 1994 (EPA 1993). In 2006, EPA revised the General Conformity Rule to include *de minimis* emission levels for $PM_{2.5}$ and its precursors (EPA 2006).

On April 5, 2010, EPA finalized revisions to the General Conformity Rule that improve on the methods Federal agencies can use to demonstrate conformity (75 FR 17253–17279) (EPA 2010b). These revisions took effect on July 6, 2010. Federal activities must not do the following:

(a) Cause or contribute to any new violation of a NAAQS

(b) Increase the frequency or severity of any existing violation of a NAAQS

(c) Delay timely attainment of any standard, interim emission reductions, or milestones in conformity with a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

The General Conformity Rule applies only to nonattainment and maintenance areas. If the emissions from a Federal action proposed in a nonattainment or maintenance area exceed annual *de minimis* thresholds (typically, 100 tons per year) identified in the rule, a formal conformity determination is required of that action. The *de minimis* thresholds are more restrictive as the severity of the nonattainment status of the region increases.

Climate Change and Greenhouse Gases. Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature.

The U.S. Global Change Research Program report *Global Climate Change Impacts in the United States* (USGCRP 2009) states the following:

> Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
>
> Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (°F). By 2100, it is projected to rise another 2 to 11.5°F. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat-trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract

some of the human-induced warming, slowing the rise in global temperature, but these effects would only last a few years.

Reducing emissions of carbon dioxide would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane, and some types of particles, such as soot, would begin to reduce warming within weeks to decades.

Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere have also been observed. Over the past 30 years, temperatures have risen faster in winter than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7 ºF. Some of the changes have been faster than previous assessments had suggested.

These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment.

GHGs include water vapor, carbon dioxide, methane, nitrous oxide, ozone, and several hydrocarbons (HCs) and chlorofluorocarbons (CFCs). Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The GWP of a particular gas provides a relative basis for calculating its carbon dioxide equivalent or the amount of carbon dioxide that emissions of that gas would be equal to. Carbon dioxide has a GWP of 1, and is, therefore, the standard by which all other GHGs are measured.

The following is a summary of the Federal and DoD air quality rules and regulations that may apply to emission sources associated with the proposed action and alternatives.

EPA issued the *Final Mandatory Reporting of Greenhouse Gases Rule* on October 30, 2009 (EPA 2009a). This rule does not apply to mobile sources of GHGs and would not apply to the JPARC airspace training activities, but would apply to installations and ground-based maneuvers. Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, was signed by President Bush on January 24, 2007. The EO instructs Federal agencies to conduct their environmental, transportation, and energy-related activities in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. The EO requires Federal agencies to meet specific goals to improve energy efficiency and reduce GHG emissions by annual energy usage reductions of 3 percent through the end of fiscal year 2015, or by 30 percent by the end of fiscal year 2015, relative to the baseline energy use of the agency in fiscal year 2003. According to EO 13423 § 8(c), military tactical equipment and vehicles may be exempted from this EO. In general, EO 13423 applies to activities and operations at the installation rather than to aircraft training activities. Thus, the JPARC training airspace is exempt from EO 13423, but installations and ground-based maneuvers in training areas related to the proposed actions are not exempt.

In addition to EO 13423, on October 5, 2009, President Obama signed EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, to establish an integrated strategy toward sustainability in the Federal Government and to make reduction of GHGs a priority for Federal agencies. Under this EO, the Air Force will be reporting a comprehensive inventory of GHG emissions, including such emissions associated with the areas potentially affected by the proposed actions, annually beginning in the first fiscal year of training activities. The emissions reported will include all "Scope 1" emissions, which are all direct emissions of GHGs owned or controlled by the agency; all "Scope 2" emissions, which are all indirect emissions of GHGs from electricity, steam, or heat purchased by the agency; and all "Scope 3" emissions, which includes supply chain, business travel, and employee commuting emissions. The comprehensive GHG emissions inventories will, among other things, include emissions from aircraft operations; tactical and highway vehicles; and non-road engines and equipment. While GHG emissions from aircraft and tactical vehicles and equipment were required to report annually beginning with fiscal year 2010, these combat and combat support systems are not subject to the EO's GHG emissions reduction target. EO 13514 § 19(h) identifies an exemption for non-road vehicles and equipment, including aircraft, that are used in combat support or training for such operations. However these exemptions do not apply when it comes to NEPA regulations, which require that the GHG emissions from these operations be assessed.

On February 18, 2010, the CEQ released its Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ 2010), which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more per year CO_2e should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance but a minimum level that would require consideration in NEPA documentation. The purpose of quantitative analysis of CO_2e emissions in this EIS is for its potential usefulness in making reasoned choices among alternatives.

The potential effects of GHG emissions from the Proposed Action are by nature global. "Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes.

State Regulations. The State of Alaska Air Quality Control Regulation (18 AAC 50) (ADEC 2011a) establishes statewide ambient air quality standards, designations, classifications, and controls in accordance with the CAA. Regulation 18 AAC 50 also establishes a state air quality control plan and identifies other Federal standards adopted by reference.

Regulation 18 AAC 50 was recently modified to incorporate a new GHG permitting threshold of 3,750 tons per year of carbon dioxide equivalent (18 AAC 50.326[e]). This permitting requirement applies to any new or existing stationary sources in the state, but would not apply to emissions from mobile sources such as military aircraft training operations.

Air Force Regulations. AFI 32-7040, *Air Quality Compliance and Resource Management* (Air Force 2007d), which implements Air Force Policy Directive 32-70, *Environmental Quality* (Air Force 1994a), provides details on the Air Force Air Quality Compliance and Resource Management Program and explains how to assess, attain, and sustain compliance with the Clean Air Act; other Federal, state, and local environmental regulations; Final Governing Standards or the Overseas Environmental Baseline Guidance Document; applicable international agreements; and related DoD and Air Force directives.

Army Regulations. AR 200-1, *Environmental Protection and Enhancement* (Army 2007b), regulates how military or civilian personnel, tenants on post, and contractors at Army facilities manage environmental assets such as air quality. It includes, but is not limited to, policies covering the following

actions: achieve and maintain air quality standards to protect human health and the environment; comply with Federal, state, and local air quality regulations, permit requirements, and Overseas Governing Standards; identify and implement cost-effective pollution prevention measures that will reduce toxic or criteria emissions; and eliminate ozone-depleting substances.

B.4.3 General Description of Affected Environment

Regional Air Quality. Federal regulations at 40 CFR 81 delineate certain air quality control regions (AQCRs) originally designated based on population and topographic criteria closely approximating those of each air basin. The potential influence of emissions on air quality would typically be confined to the air basin in which the emissions occur. The State of Alaska is divided into four AQCRs: (1) the Cook Inlet Intrastate AQCR, (2) the Northern Alaska Intrastate AQCR, (3) the South-Central Alaska Intrastate AQCR, and (4) the Southeast Alaska Intrastate AQCR.

Portions of Fairbanks North Star Borough (Cities of Fairbanks and North Pole) have been designated as nonattainment areas for the $PM_{2.5}$ NAAQS and as maintenance areas for the carbon monoxide NAAQS (as shown in Figure B-4). The Fairbanks and North Pole urban areas were redesignated from nonattainment status to attainment for the carbon monoxide NAAQS in 2004. As such, both areas are subject to maintenance plan requirements for carbon monoxide as required under 42 U.S.C. 7505a, and as adopted by reference in 18 AAC 50.030 as part of the Alaska state air quality control plan. In these localities temperature inversions often exacerbate air quality issues during winter months.

The proposed actions could impact visibility in pristine PSD Class I areas near the project region. The PSD Class I areas of concern are the Denali Wilderness Area in south-central Alaska and the Tuxedni Wilderness Area in southern Alaska. The closest portion of the Denali Wilderness Area is approximately 15 miles from the Fox 3 MOA, and most of the proposed actions would occur within the surrounding area. The Tuxedni Wilderness Area is approximately 300 miles from the Fox 3 MOA. The proposed live-fire exercises of AIM-9 and AIM-120 missiles over the Gulf of Alaska would occur approximately 115 miles from the Tuxedni Wilderness Area.

Regional Air Emissions. Most of the proposed actions covered in this EIS take place in six adjacent Boroughs and Census Areas: Fairbanks North Star, Denali, Southeast Fairbanks, Matanuska-Susitna, Yukon-Koyukuk, and Valdez-Cordova. Table B–12 summarizes the estimated 2008 annual emissions for the affected Boroughs and Census Areas (EPA 2010c). The area with the highest overall emissions was Matanuska-Susitna Borough and Yukon-Koyukuk Census Area and Denali Boroughs had the lowest emissions in the affected region.

Regional Climate. Meteorological data collected around Eielson AFB was used to describe the climate of the JPARC project area which is primarily located in the area surrounding the base. The meteorological data used in this report was obtained from the Western Regional Climate Center (WRCC).

Temperature. Alaska is divided into five different climate zones, and most of JPARC is located in the Interior or Interior Basin Zone. The Interior region has the widest range of temperature: from 80°F during the summer to below minus 50°F during the winter months (WRCC 2010).

Precipitation. Average annual precipitation for Alaska is 22.5 inches. Annual precipitation in the state peaks in the summer months (July through September) due to monsoonal flow. The peak monthly average rainfall of 2.88 inches occurs in August and September. Spring is the driest season, as the lowest monthly average of 1.04 inches occurs in April (WRCC 2010).

Table B–12. Annual Emissions for Alaskan Boroughs and Census Areas Affected by the Proposed Action (Calendar Year 2008)

Sector	Air Pollutant Emissions (tons per year)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Fairbanks North Star Borough						
Stationary Sources	6,970	1,417	15,946	1,876	1,498	1,333
Mobile Sources	14,548	1,351	103	85	63	2,421
Total	21,517	2,768	16,050	1,962	1,561	3,754
Denali Borough						
Stationary Sources	433	79	982	117	32	52
Mobile Sources	1,102	342	14	13	4	244
Total	1,534	421	997	130	35	295
Southeast Fairbanks Southeast Fairbanks Census Area						
Stationary Sources	133	92	2,915	322	60	112
Mobile Sources	2,601	198	14	11	5	386
Total	2,734	290	2,929	332	65	498
Matanuska-Susitna Borough						
Stationary Sources	1,105	247	16,728	1,898	131	1,151
Mobile Sources	21,792	2,386	121	97	40	3,083
Total	22,898	2,632	16,849	1,994	171	4,234
Valdez-Cordova Census Area						
Stationary Sources	237	124	3,357	407	121	510
Mobile Sources	5,933	9,627	396	375	982	894
Total	6,170	9,751	3,753	782	1,103	1,405
Yukon-Koyukuk Census Area						
Stationary Sources	191	363	3,194	361	66	121
Mobile Sources	3,676	382	26	19	19	568
Total	3,867	745	3,220	380	85	688

Key: CO=carbon monoxide; NO_x=nitrogen oxides; $PM_{2.5}$=particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers; PM_{10}= particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; SO_2=sulfur dioxide; VOC=volatile organic compound.

Source: EPA 2010c.

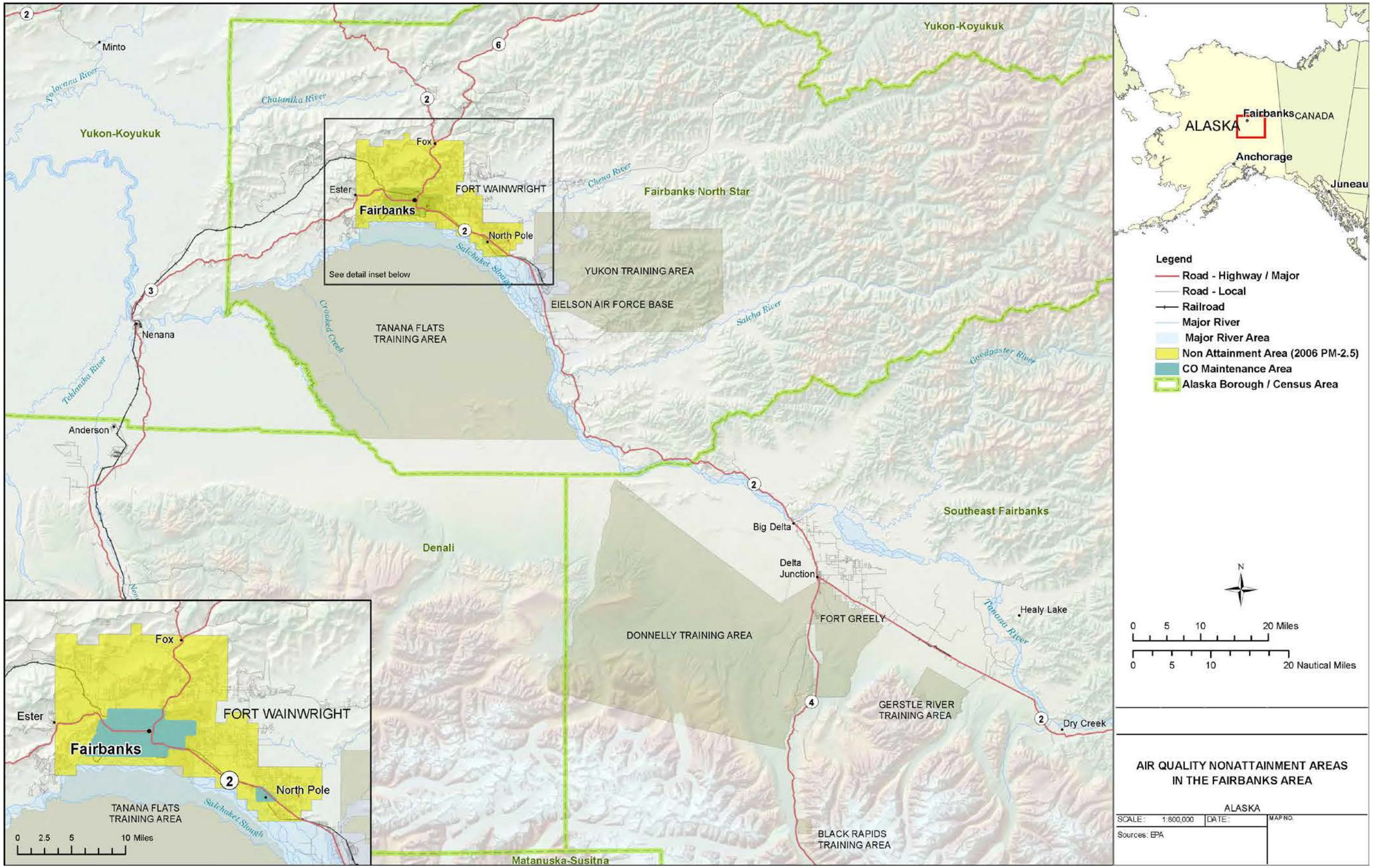

Figure B-4. Locations of CO Maintenance and PM2.5 Nonattainment Areas

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Prevailing Winds. The annual average windspeed at Eielson AFB is 5.4 mph. April through July experience the strongest winds, with a monthly average speed of 6.8 mph during this period. Prevailing winds are from the south during the year.

Volcanoes. There are more than 40 active volcanoes in Alaska, with much of the volcanic activity concentrated in the Aleutian Islands and the mountainous region just to the west of Cook Inlet. Mount Spurr, the northernmost historically active volcano in Alaska, is approximately 75 miles west of Anchorage. Aside from the potential effects of a volcanic eruption on the surrounding landscape, ash clouds can have wide-reaching impacts on climate and air quality.

Wildfires. There is potential for naturally occurring wildfires in Alaska which can be substantial both esthetically and from a health standpoint. Forest wildfires emit visible pollution in the form of smoke, soot, and ash. Additionally, such fires emit carbon monoxide, nitrogen oxides, and hydrocarbons. Smoke from fires can hurt the eyes, irritate the respiratory system, and worsen chronic heart and lung diseases. Additional information regarding wildfire smoke can be found at the ADEC's website: http://dec.alaska.gov/air/smoke_qa.htm.

B.4.4 Applicability of Conformity Regulation

Of the areas potentially affected by the proposed action, the Fairbanks and North Pole urban areas are classified as maintenance areas for the carbon monoxide NAAQS, and portions of Fairbanks North Star Borough was recently designated as a nonattainment area for the $PM_{2.5}$ NAAQS. Moreover, to the south, Anchorage is a nonattainment area of the PM_{10} NAAQS and is a maintenance area for the carbon monoxide NAAQS. The affected region is in attainment of the remaining NAAQS.

Therefore, the requirements of EPA's General Conformity Rule are applicable to carbon monoxide and $PM_{2.5}$ emissions from proposed actions within the nonattainment or maintenance areas of the affected region.

The applicable *de minimis* conformity thresholds for these areas are 100 tons per year of carbon monoxide and $PM_{2.5}$. If the emissions from the proposed action exceed any of the applicable *de minimis* thresholds, the Air Force must demonstrate that these emissions would conform to the SIP through application of one or more of the criteria for determining conformity of general Federal actions prescribed in 40 CFR 93.158, under the procedures prescribed in 40 CFR 93.159. In such cases, if the emissions are found to conform to the approved SIP, then impacts from the proposed actions would be less than significant. For actions that are proposed to occur in attainment areas, the analysis used the PSD threshold for new major sources of 250 tpy of each pollutant as an indicator of significance or nonsignificance of projected air quality impacts.

B.4.5 Overall Methodology

The project air quality analysis estimated the magnitude of increased emissions from the proposed enhancement and modernization actions in various sections of JPARC. The estimation of proposed operational emissions was based on the net change in emissions between existing JPARC operations and proposed JPARC operations.

Appendix F of this EIS documents the calculations used to estimate proposed emissions for each specific action.

Construction: There will potentially be construction activity associated with the Enhanced Ground Maneuver Space, TFTA Roadway Access, Immediate Staging Bases, and Joint Air–Ground Integration Complex actions, all of which will be analyzed programmatically. These construction activities will not take place in any nonattainment or maintenance zones. The air quality analysis of the impacts of these

actions will be performed qualitatively, as the predicted emissions will be minor and intermittent in nature.

Operations: Air quality impacts associated with the proposed action alternatives would occur from (1) combustive emissions due to the use of fossil fuel–powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of vehicles and equipment on exposed soil. Combustive emission sources associated with proposed operations would include (1) aircraft during military-mode operations below 3,000 feet AGL, (2) tactical vehicles, (3) tactical support equipment, and (4) ordnance use. Combustive emissions from proposed aircraft training operations were only assessed for aircraft training activities below 3,000 feet AGL, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. Aircraft emissions above the mixing layer generally would not appreciably affect ground-level air quality.

Operational data used to calculate proposed increased aircraft emissions at each area are consistent with those evaluated in the project noise analyses. When available, the operational characteristics of proposed aircraft flight operations were based on information provided by the Air Force. These data include flight durations, annual number of sorties, and altitude profiles for each aircraft involved in the proposed action. UAV operational information and emission factors were obtained from *Environmental Assessment for Routine and Recurring Unmanned Aerial Vehicle Flight Operations at Edwards AFB, CA* (Tetra Tech 2006). The remainder of the data for the flight profiles was gathered in the Air Force Center for Engineering and the Environment (AFCEE) *Air Emissions Factor Guide to Air Force Mobile Sources* (AFCEE 2009), which include aircraft modes of operation, engine power settings, and fuel usage. Emission factors used to calculate combustive emissions from proposed munitions sources were obtained from Section 15 of EPA's AP-42, *Compilation of Air Pollutant Emission Factors* (EPA 2009b).

There are no expected changes to operations at the various bases or on MTRs related to JPARC. Thus, the project air quality analysis only quantified emissions from proposed aircraft, equipment, and ordnance usage within the ranges and MOAs affected by the proposed actions. Additionally, air quality impacts associated with proposed Army action alternatives would occur from (1) combustive emissions due to the use of fossil fuel–powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of vehicles and equipment on exposed soil. Combustive emission sources associated with proposed operations would include (1) helicopters; (2) aircraft; (3) tactical vehicles such as the Stryker; (4) tactical support equipment; and (5) ordnance use.

Emissions that occur within the affected airspaces have the potential to impair visibility within pristine PSD Class I areas. Visibility impairment could occur from projected primary emissions of nitrogen dioxide, sulfur dioxide, and PM_{10} or secondary formation of visibility-reducing particulate matter in the atmosphere due to precursor emissions of VOCs, nitrogen dioxide, or sulfur dioxide. Visibility impairment from primary nitrogen dioxide emissions could occur as a brown-colored haze in the lower layer of the atmosphere. This situation usually would occur during the colder months of the year, when a lack of sunlight prevents the conversion of this pollutant to nitrogen oxide and oxygen. Visibility impairment due to primary PM_{10} emissions would occur in the form of plume blight or atmospheric discoloration from contrails. Visibility impairment due to the secondary formation of nitrate or sulfate particulates in the atmosphere from emissions of nitrogen dioxide or sulfur dioxide would usually occur in the warmer months of the year. This effect would take the form of regional haze, which would reduce regional visual range. Therefore, due to the proximity of the pristine protected areas to proposed aircraft operations, this EIS provides a qualitative analysis of the potential for proposed emissions to affect visibility and air quality at the Denali and Tuxedni Wilderness Areas.

The potential effects of GHG emissions from the proposed action are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental

impact. Nonetheless, the GHG emissions from the project alternatives were quantified to the extent feasible in this EIS for information and comparison purposes.

B.5 PHYSICAL RESOURCES

B.5.1 Definition of Resource

Physical sciences include topography, geologic hazards, and soils, including permafrost. Topography comprises the physiographic or surface features of an area and is usually described with respect to elevation, slope, aspect, and landforms. Topography can provide both beneficial and hindering conditions for development and use. Geologic hazards include natural geologic features that can have a direct impact upon human activity and present a potential danger to life and property. Geologic hazards can include earthquakes, landslides, and volcanic activity.

The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Because soil cover supports surface vegetation and water retention, it indirectly influences groundwater recharge and controls the flow in rivers and streams. Soil properties have a direct influence on the suitability of earth-disturbing activities such as construction and off-road maneuvering.

B.5.2 Regulatory Setting

B.5.2.1 Clean Water Act

As authorized by the Clean Water Act, Section 402 (40 CFR 122), the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point and nonpoint sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Nonpoint source pollution can be caused by either rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and man-made pollutants, finally depositing those pollutants into lakes, rivers, wetlands, coastal waters, and groundwater. NPDES regulations include measures to prevent such pollution, including erosion-induced sedimentation of water bodies. The NPDES permit program is administered by the State of Alaska through the ADEC.

B.5.2.2 Geologic Hazards

Federal standards, such as those promulgated through the National Earthquake Hazards Reduction Program, apply to new Federally owned, constructed, or assisted buildings. One such Federal standard, EO 12699, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*, was signed by President George H. W. Bush on January 5, 1990, to further the goals of PL 95-124, *Earthquake Hazards Reduction Act of 1977*, as amended. Guidelines and procedures for implementing the EO were prepared in 1992 by the Federal Interagency Committee on Seismic Safety in Construction. The guidelines establish minimum acceptable seismic safety standards, provide evaluation procedures for determining the adequacy of local building codes, and recommend implementation procedures. Each Federal agency is independently responsible for ensuring appropriate seismic design and construction standards are applied to new construction under its jurisdiction.

B.5.3 General Description of Affected Environment

B.5.3.1 Topography

Topography in the JPARC planning area is greatly varied, with elevation ranging from sea level at coastal areas of the Cook Inlet to 20,320 feet above sea level at Mount McKinley in the Alaska Range (see Figure B-5). Major physiographic divisions within the planning area include the Kenai-Chugach Mountains, Cook Inlet-Susitna Lowland, the Alaska Range, the Northern Foothills of the Alaska Range, the Tanana-Kuskokwim Lowland, the Kuskokwim Mountains, and the Yukon-Tanana Upland. Descriptions of each below are taken from *Physiographic Divisions of Alaska* (USGS 1965).

Kenai-Chugach Mountains. This physiographic division forms a barrier on the north coast of the Gulf of Alaska. Mountains have east-trending ridges that rise 7,000 to 13,000 feet above sea level. Lower segments are formed by larger mountains 5 to 10 miles across and 3,000 to 6,000 feet in elevation, separated by a system of trough valleys. The entire range is marked by glacial features, such as horns, arêtes, cirques, and rock basin lakes. Coastal areas to the south are punctuated by fjords and sounds.

Cook Inlet-Susitna Lowland. The Cook Inlet-Susitna Lowland is a glaciated, low-lying area containing ground moraine and stationary ice topography, drumlin fields, eskers, and outwash plains. Much of the lowland is less than 500 feet above sea level and has local relief of 50 to 250 feet. Upland areas near the adjoining mountain ranges rise to approximately 3,000 feet and isolated mountain ranges can rise to 4,800 feet.

Alaska Range. The southern part of the Alaska Range consists of multiple glaciated, north-trending ridges from 7,000 to 14,000 feet in elevation, between which lie broad glaciated valleys with floors of less than 3,000 feet. Local relief is usually between 4,000 and 9,000 feet. In the central and eastern parts of the Alaska Range, two of three parallel glaciated ridges of 6,000 to 9,000 feet in altitude are punctuated by snow-capped mountains at over 9,500 feet. Mount McKinley, the highest point in North America, is located in the Alaska Range.

Northern Foothills of the Alaska Range. The Northern Foothills consist of flat-topped, east-trending ridges 2,000 to 4,500 feet in altitude, 3 to 7 miles wide, and 5 to 20 miles long, separated by rolling lowlands 700 to 1,500 feet high and 2 to 10 miles wide. The foothills are currently without glaciers, but some valleys were widened from Alaska Range glaciers in the last few million years.

Tanana-Kuskokwim Lowland. This division is a broad depression bordering the Alaska Range to the north. Outwash plains radiating from the Alaska Range slope downward (north) 20 to 50 feet per mile to floodplains along streams. The floodplains are generally incised in areas where rivers are present approximately 50 to 200 feet below the level of the lowland.

Kuskokwim Mountains. The Kuskokwim Mountains Division is a succession of northeast-trending ridges with rounded to flat summits 1,500 to 2,000 feet high. Mountain ridges north of the Kuskokwim River rise to approximately 2,000 feet and are succeeded at intervals of 10 to 30 miles by isolated circular groups of glaciated mountains 3,000 to 4,400 feet in altitude. Valley floors in this physiographic division are approximately 1 to 5 miles in width.

Yukon-Tanana Upland. Notable features in the Yukon-Tanana Upland include rounded top ridges with gentle side slopes, which rise 3,000 to 5,000 feet in altitude, with some domes up to 6,800 feet high. Valleys are generally flat, floored by alluvium, and 0.25 to 0.50 miles wide.

B.5.3.1.1 Training Areas/Installations

Fort Wainwright, Eielson AFB, and TFTA are located in a broad depression known as the Tanana-Kuskokwim Lowland, with the Alaska Range bordering to the south and the Tanana River forming the northern boundary of TFTA and the western boundaries of Fort Wainwright and Eielson AFB. The airfield elevation on Fort Wainwright is 448 feet, and on Eielson AFB, 547 feet. Topography on TFTA slopes upward to the southeast with elevations increasing from just under 400 feet above sea level in the northwestern area of the installation closest to the Tanana River to just over 1,100 feet above sea level on the southern boundary. Topographic features of note on TFTA include the Clear Creek and Wood River Buttes, each at just under 1,000 feet in elevation. The highest points on TFTA are found on several small, unnamed peaks at just over 1,400 feet in the area surrounding Blair Lakes.

YTA is located in the Yukon-Tanana Uplands Division, with elevations rising 500 to 1,500 feet above the valley floors. Rounded ridges (elevations from 3,000 to 5,000 feet) with gentle side slopes and valley floors from 0.25 to 0.50 miles wide are common features. Low elevations are seen in the western portions of the training area closest to the course of the Tanana River and in the numerous river valleys spread throughout YTA.

DTA is within the Yukon-Tanana terrain, an area of highly varied topography. It is situated in the northern foothills of the Alaska Range and on alluvial plains just north of the foothills. Much of the area is generally level or gently sloping, with elevations ranging from 1,200 to 1,600 feet. In the southern portion of DTA, elevations range from 2,000 to 4,500 feet, where flat-topped, east-trending ridges are found. The highest elevations on DTA are in the southwestern areas, where elevations range from 4,000 to 6,200 feet. Prominent topographic features on DTA include Molybdenum Ridge (5,993 feet) and Donnelly Dome (3,910 feet). The Delta River flows through the eastern portion of DTA.

Gerstle River Training Area (GRTA) sits on the northeastern flank of Granite Mountain in a relatively flat area, with elevations ranging from 1,400 feet at the northern edge to approximately 2,000 feet at the southern edge. Sawmill Creek and several other unnamed creeks traverse GRTA before emptying into the Gerstle River, which eventually empties into the Delta River to the south.

The Black Rapids Training Area (BRTA) is located in the Alaska Range on the eastern edge of the Delta River. Elevations grade upward west to east, starting at approximately 2,000 feet at the banks of the Delta River and reaching over 5,000 feet at the eastern boundary. Several glacially-fed creeks flow through BRTA and empty into the Delta River.

JBER is located in an alluvial plain known as the Cook Inlet-Susitna Lowland, which is bordered on the east by the Chugach Mountains and on the north, south, and west by the Cook Inlet. The Chugach Mountains rise abruptly to over 5,000 feet where they face the Cook Inlet-Susitna Lowland. There is a large range in elevation on Joint Base Elmendorf-Richardson, ranging from sea level to approximately 5,300 feet at Tanaina Peak. Prominent topographic features on Joint Base Elmendorf-Richardson include Tanaina Peak, Temptation Peak, and Mount Gordon Lyon.

B.5.3.2 Geologic Hazards

Volcanoes. There are more than 40 active volcanoes in Alaska, with much of the volcanic activity located concentrated in the Aleutian Islands and the mountainous region just to the west of Cook Inlet. Mount Spurr, the northernmost historically active volcano in Alaska, is approximately 75 miles west of Anchorage. The Alaska Volcano Observatory of the U.S. Geological Survey (USGS) currently monitors 27 active volcanoes in Alaska daily. The observatory posts volcano alert levels and issues warning statements as necessary. As was the case with the eruption of Mount Redoubt in 2009, future volcanic activity would be preceded by ample warning and prediction of effects, allowing the general population and military installations to take appropriate action.

The historically active volcanoes are shown in Figure B-6. Table B–13 lists the volcanoes in proximity to the proposed action, including the year of the most recent eruption.

Aside from the potential effects of a volcanic eruption on the surrounding landscape (lava flow, pyroclastic flow, mudslides, and flooding), ash clouds can have wide-reaching impacts on aviation, health, and climate. See Section B.4, Air Quality, for information related to such ash clouds.

Table B–13. Historically Active Volcanoes Within Approximately 500 miles of Fairbanks and Anchorage, Combined

Volcano	Last Eruption
Spurr	1992
Reboubt	2009
Iliamna	1953
Augustine	2005
Wrangell	1930
Fourpeaked	2006
Katmai	1912
Novarupta	1912
Trident	1953
Ukinrek-Maars	1977
Aniakchak	1931
Veniaminof	2008

Source: USGS 2010.

Earthquakes and Faulting. Alaska spans approximately 3,000 miles of an active plate boundary between the North American and Pacific plates-and is the site of three of the ten largest earthquakes in the last 100 years. Two of these occurred in the Aleutian Islands, and the other, a magnitude 9.2 earthquake, occurred in 1964 approximately 80 miles east of Anchorage, resulting in widespread damage throughout the area. Each year, the Alaska Earthquake Information Center records and reports approximately 22,000 earthquakes statewide (AEIC 2011).

Three major faults exist in areas potentially affected by the proposed actions: the Kaltag, the Denali, and the Castle Mountain faults (Figure B-6). The east-west trending Kaltag Fault has been mapped for a distance of approximately 275 miles from the town of Unalakleet, on Norton Sound, to just east of the town of Tanana. Most recently, the fault is thought to be associated with a magnitude 6.0 earthquake, which occurred in February 2000, east of the town of Ruby (Galena 2007).

The Denali Fault extends east to west more than 1,200 miles through the interior of the state, passing through the Alaska Range and Denali National Park and on to the Bering Sea. In November 2002, a magnitude 7.9 earthquake occurred on the Denali Fault with an epicenter approximately 90 miles south of Fairbanks, causing thousands of landslides but little structural damage and no deaths. The Denali Fault is thought to be capable of producing a magnitude 8.0 earthquake (Galena 2007). Three earthquakes in excess of magnitude 7.0 have occurred within 50 miles of Fairbanks since 1952 (USARAK 2004).

The Castle Mountain Fault trends northeast to southwest for over 100 miles, extending from south of the Alaska Range to near Anchorage. This fault has been responsible for several earthquakes of magnitude 7.0 or greater in the last century (USGS 2003). The Anchorage area has experienced at least nine major earthquakes of magnitude 7.0 or greater in the last 90 years, including the 1964 earthquake, the largest in U.S. history.

In addition, several smaller faults, including the Mystic Mountain and Granite Mountain faults, are located in the areas potentially affected by the proposed actions.

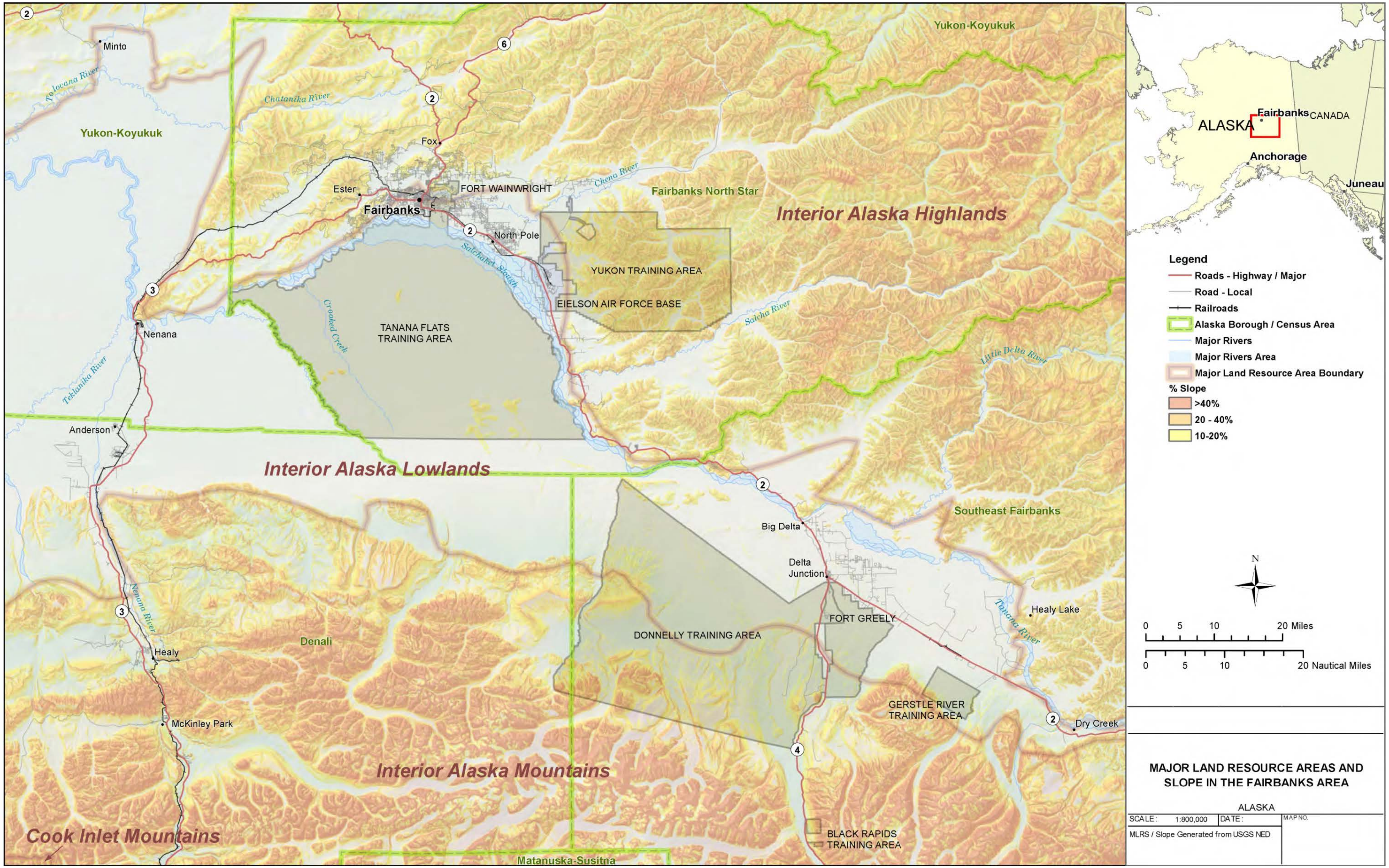


Figure B-5. Major Land Resource Areas and Slope in the Fairbanks Area

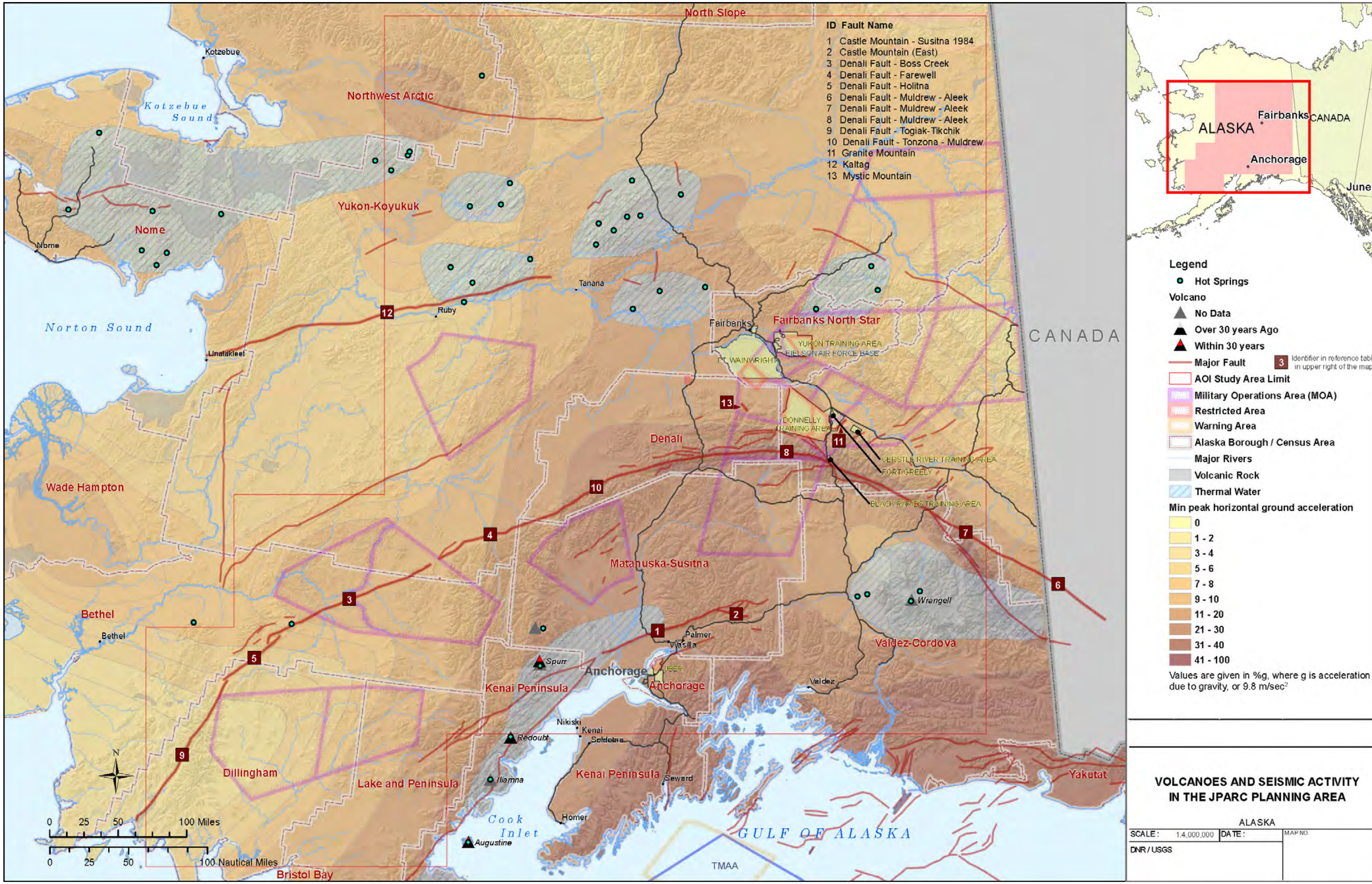


Figure B-6. Volcanoes and Seismic Activity in Central Alaska

B.5.3.3 Soils

Soils within areas potentially affected by the proposed actions are highly diverse; noticeable differences can occur even within short distances. Soils can be high in organic content, hydric, sandy, gravelly, or shallow over bedrock or permafrost. Soil types and characteristics can also vary greatly depending upon elevation, climate, and other regional (and local) conditions.

The Natural Resources Conversation Service (NRCS) of the U.S. Department of Agriculture (USDA) has divided the United States into Major Land Resource Areas (MLRAs), geographically associated land units organized by patterns in topography, water resources, soils, geology, resources and resource uses, and soil and water conservation treatment needs (USDA 2006). MLRAs that appear in the area potentially affected by the proposed actions are shown in Figure B-7. Characteristics of each of these MLRAs as they pertain to elevation and soil characteristics (dominant features and concerns, if any) are summarized in Table B–14.

The NRCS uses soil associations or soil taxonomic class to categorize soils at larger scales, usually comprised two or more types of component soils, grouped by similar characteristics and properties (e.g., slope, temperature, moisture, chemistry). In the area potentially affected by the proposed action there are approximately 24 soil associations, the majority of which are categorized as Typic Histoturbels. Specific characteristics of such soils will vary by location and local condition;[1] therefore, only general observations are made about potential limitations to use and development of the soils in Table B–14. More detailed analysis of soil types and limitations are provided in Chapter 3 for specific proposals.

Hydric Soils. Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (oxygen-free) conditions in the upper part of the soil. Hydric soils are one of the three critical indicators, as defined by the U.S. Army Corps of Engineers, for the presence of wetlands (Wetlands are discussed in further detail in Section B.8, Biological Resources) (USACE 1987). Hydric soils are generally saturated and thawed in interior Alaska during May and from late July through September. Hydric soils most commonly occur in groundwater discharge zones, in depressions and flats, and also extensively across hill slopes in areas where restrictive layers (permafrost, glacial till) in the soil hold water above the regional water table (USDA 2005).

B.5.3.4 Permafrost

A defining, and often limiting, feature of soils in Alaska is permafrost, which can be found in varying depth and thickness under approximately 85 percent of the state’s land area. Permafrost is broadly defined as soil, silt, or rock that has remained below freezing for two or more years. Although a thin layer of permafrost closest to the surface can thaw during warmer summer months, most of the permafrost remains frozen unless the local climate changes or melting is facilitated by the disturbance of overlying vegetation (which acts as an insulator). Depth from the surface to permafrost can vary from less than 1 foot up to 1,000 feet. Generally speaking, permafrost in Alaska is continuous north of the Brooks Range, found at varying depths and thickness in interior and western Alaska, and occurs only sporadically in south-central and southeastern portions of the state. Permafrost may occur in any area where the average annual temperature is below freezing. Since the surface of permafrost is generally impermeable, water flow in the area of permafrost can be restricted, leading to areas of surface saturation in the summer months.

1 At scales of less than 1:24,000, the NRCS uses the soil map unit as the organizing scheme for the description of soil properties. Soil map units provide more detailed soil analyses than the more general soil association, which can contain multiple soil map units.

Permafrost presents challenges to ground-based maneuvering as well as construction activities. Special consideration must be given to the design and maintenance of man-made structures, usually involving the creation of a gravel bed (or other material) to create an insulating layer below the structure to prevent melting of the active permafrost layer (USGS 1969).

Much of the permafrost in Alaska is covered by some variety of vegetation. If vegetation is removed through wildfire or human activity, this insulating layer is lost and permafrost can begin to melt. In finer-grained soils, this melting can result in soil saturation and a subsequent loss of soil stability. If the soil contains large blocks, wedges, or lenses of ice, voids will appear in the soil as the permafrost around it thaws. Landscape that results from the melting of permafrost, called thermokarst, presents serious challenges to all types of land use (USDA 2004). Surface expressions of thermokarst include such features as mounds (pingos), sinkholes, pits, polygons, subsidence, and circular lowlands. Permafrost conditions are present in the area affected by the JPARC proposals, as shown in Figure B-8.

B.6 WATER RESOURCES

B.6.1 Definition of Resource

Water resources include surface water, groundwater, floodplains, and features determined to be waters of the United States, including wetlands. Surface water resources—lakes, rivers, and streams—are important for a variety of reasons, including economic, ecological, recreational, and human health. Groundwater includes the subsurface hydrologic resources of the physical environment, and its properties are often described in terms of depth to an aquifer or the water table, water quality, and surrounding geologic composition.

B.6.2 Regulatory Setting

The Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 et seq.), as amended, requires that individual states develop programs to monitor and report on the quality of surface and groundwater and prepare a report summarizing the status of its water quality. The process for developing information on the quality of water resources is contained in several sections of the CWA. Most notable are Section 305(b), which requires that the quality of all waterbodies be characterized, and Section 303(d), which requires that states list any water bodies that do not meet water quality standards. EPA has recommended that the Section 305(b) report and the Section 303(d) list of impaired waters be integrated into a single, comprehensive monitoring and assessment report, the Integrated Water Quality Monitoring and Assessment Report (Integrated Report). The State of Alaska Water Quality Standards are documented in the Alaska Administrative Code (18 AAC 70) (ADEC 2009a) and in an annual report (ADEC 2010a).

The CWA and the EPA Storm Water General Permit regulate pollutant discharges. As authorized by the CWA, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. The NPDES permit program is administered by the State of Alaska through the ADEC.

EO 11988, *Floodplain Management*, requires Federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains. Floodplains are defined in the EO as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the areas subject to a one percent or greater chance of flooding in any given year."

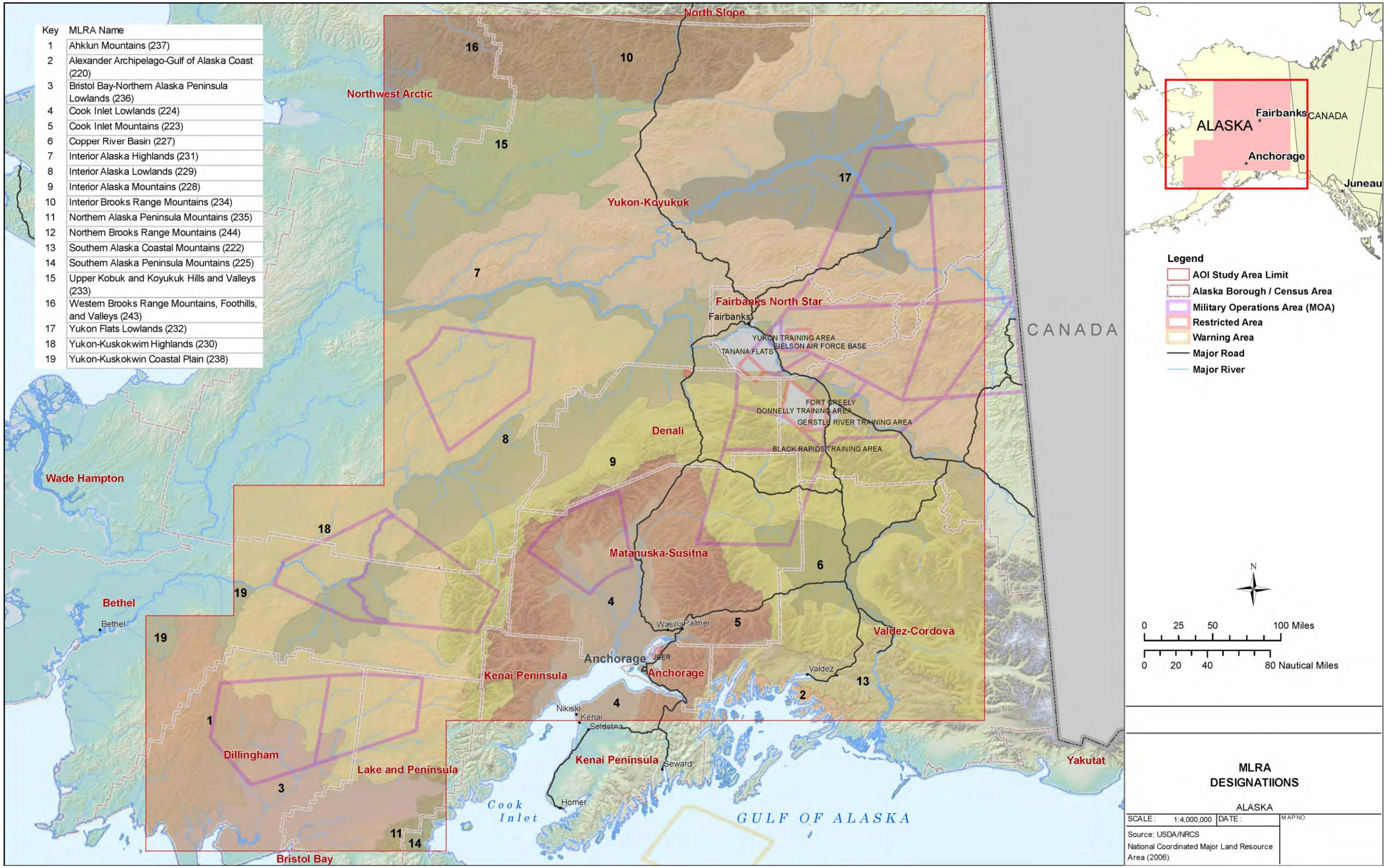
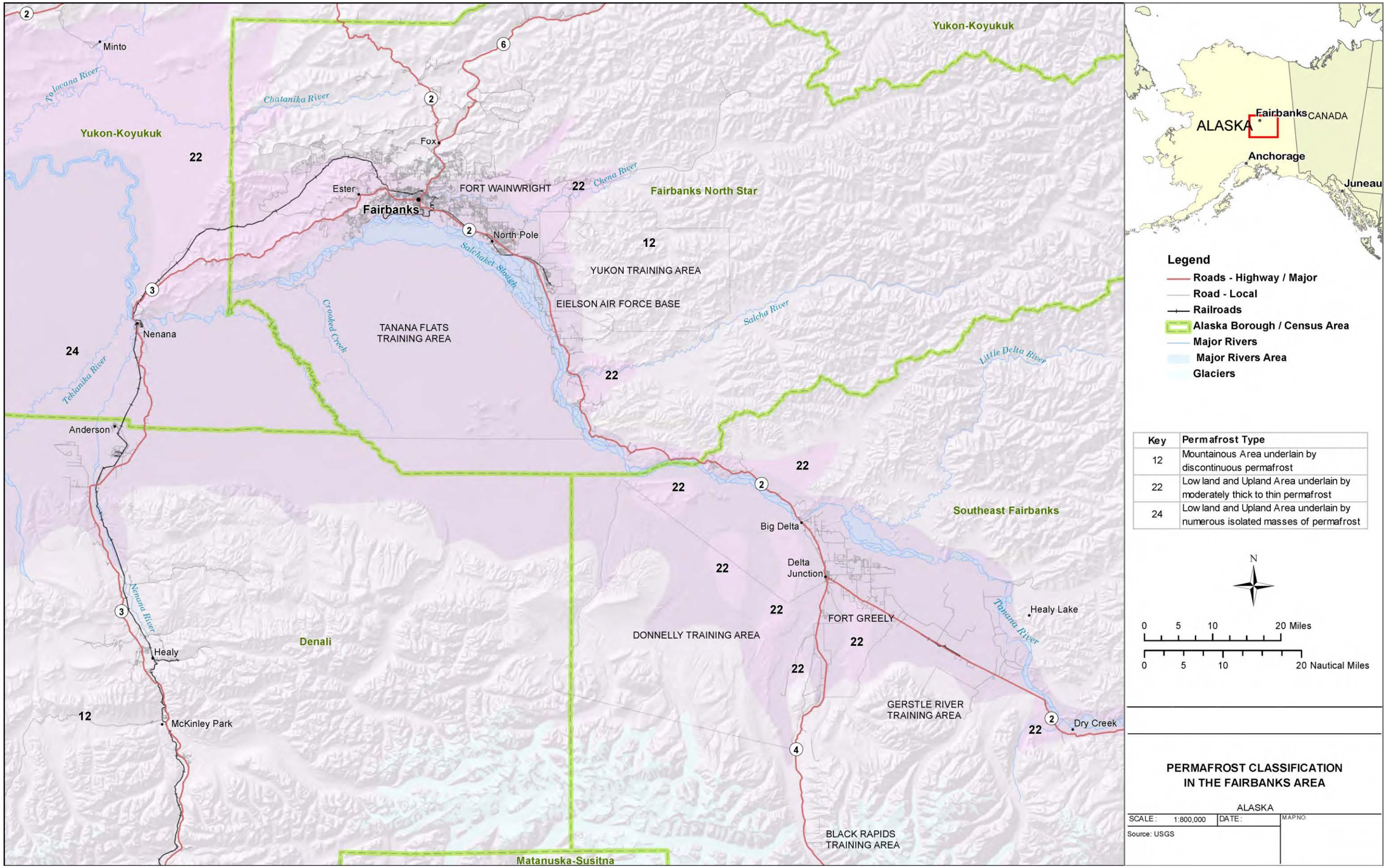


Figure B-7. MLRA Designations



Key	Permafrost Type
12	Mountainous Area underlain by discontinuous permafrost
22	Low land and Upland Area underlain by moderately thick to thin permafrost
24	Low land and Upland Area underlain by numerous isolated masses of permafrost

Figure B-8. Permafrost Classification in Fairbanks Area

Table B–14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Alexander Archipelago – Gulf of Alaska Coast (220)	Sea level to 4,665	This MLRA is outside of permafrost region and is generally free of permafrost.	Major soil resource concerns are water erosion and mass wasting. Mass wasting induced by earthquakes and erosion can take the form of creep, earthflow, rockfall, slump, debris avalanche, and debris flow. Undercutting or overloading slopes, vibrations from earthquakes, and increased soil moisture content can trigger mass movements. Mass wasting can be a natural phenomenon or the result of human activities, such as logging and road construction. Miscellaneous (nonsoil) areas make up about 23 percent of this MLRA. The most common miscellaneous areas are chutes, rock outcrop, rubble land, beaches, riverwash, and water (glaciers make up less than 1 percent of the total areas and are limited to the higher elevations; lakes make up less than 2 percent of the area). Most glacial deposits have been eroded away or buried by mountain colluvium and alluvium, which cover about 90 percent of the present landscape.
Southern Alaska Coastal Mountains (222)	Sea level to 18,008	This MLRA is generally underlain by isolated masses of permafrost. The southern portions of this MLRA are outside of permafrost region and generally free of permafrost.	There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up more than 90 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, chutes, and glaciers (glaciers and ice fields make up about 54 percent of the total area; lakes make up less than 1 percent). Most glacial deposits have eroded away or have been buried by colluvium and slope alluvium, which covers more than 90 percent of the present unglaciated landscape.
Cook Inlet Mountains (223)	2,500 to 20,320	This MLRA is generally underlain by isolated masses of permafrost or areas of discontinuous permafrost. The southern portion of this MLRA is outside of permafrost region and is generally free of permafrost.	There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up about 70 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and glaciers (glaciers and ice fields make up about 15 percent of the total MLRA area; lakes make up about 2 percent of the area). Colluvial and alluvial deposits cover about 65 percent of the present landscape.
Cook Inlet Lowlands (224)	Sea level to 4,396	This MLRA is generally underlain by isolated masses of permafrost or areas of discontinuous permafrost. The southern portion of this MLRA is outside of permafrost region and is generally free of permafrost.	Major resource concerns are water erosion and water quality. Off-road vehicle use is an increasing problem throughout much of the MLRA, contributing locally to the destruction of the existing vegetation and causing surface compaction, erosion (sheet and rill, concentrated flow, and gully), damage to stream channels and fisheries, and changes in access and land use. Conservation practices that minimize ground disturbance and maintain an adequate plant cover are needed. Conservation practices on forestland generally include forest stand improvement; proper construction of roads, landings, and stream crossings; and road closures. Critical-area stabilization is important in many areas disturbed or damaged by off-road vehicles. Miscellaneous (nonsoil) areas make up about 15 percent of this MLRA. The most common miscellaneous areas are beaches, riverwash, and water.

Table B-14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions (*continued*)

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Copper River Basin (227)	600 to 3,806	This area is in the zone of discontinuous permafrost, which can be moderately thick in some locations. Permafrost is commonly close to the surface in areas of the finer-textured sediments on plains, stream terraces, and the more gently sloping footslopes and hills. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and in close proximity to lakes and other water bodies.	Major soil resource concerns are wind erosion and water erosion in areas where the native vegetation has been removed. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 12 percent of this MLRA. The most common miscellaneous areas are riverwash and water (lakes make up about 10 percent of the area).
Interior Alaska Mountains (228)	1,500 to 20,320	This area is in the zone of discontinuous permafrost. Generally, permafrost is close to the surface only in areas of the finer-textured sediments on stream terraces and in swales on hills and footslopes. In the mountains, permafrost occurs only in gently sloping areas of rounded ridges, swales, and footslopes. Flood plains generally have no permafrost.	There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up about 58 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and glaciers (glaciers and permanent ice and snow make up about 15 percent of the area; lakes and ponds make up less than 1 percent of the area.) Mountain colluvium and alluvium cover about 60 percent of the present landscape.
Interior Alaska Lowlands (229)	100 to 1,900	This area is in the zone of discontinuous permafrost, which can be moderately thick in some locations. Permafrost commonly is close to the surface in areas of the finer-textured sediments on plains, stream terraces, and the more gently sloping footslopes and hills. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and in areas near lakes and other water bodies.	Major soil resource concerns are wind erosion and water erosion in areas where the native vegetation has been removed. Most urban and rural developments are adjacent to rivers, in areas where flooding is a severe hazard. Flooding is associated with spring snowmelt and runoff from the adjacent mountains and ice jamming at river bends during periods of ice breakup. Conservation practices on forestland generally include timber stand improvement and proper construction of roads, landings, and stream crossings. Erosion and sediment control practices are important in the areas used for urban development. Miscellaneous (nonsoil) areas make up about 19 percent of this MLRA. The most common miscellaneous areas are riverwash and water (lakes make up about 10 percent of the area). Thick eolian (wind-carried) deposits, including loess and sand dunes, make up about 12 percent of the area.
Yukon-Kuskokwim Highlands (230)	30 to 4,508	This area is in the zone of discontinuous permafrost, can be moderately thick in some locations. Permafrost commonly is close to the surface in areas of the finer textured sediments throughout the MLRA. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. The prevalence of permafrost decreases to the southwest. Permafrost generally does not occur on flood plains or on south-facing slopes on steep mountains.	**Soils:** Major soil resource concerns are erosion of the shallow soils on uplands and disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 10 percent of this MLRA. The most common miscellaneous areas are rock outcrop and rubble land (lakes make up about 7 percent of the area). In many valleys placer mine tailings are common.

Table B-14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions (*continued*)

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Interior Alaska Highlands (231)	400 to 6,583	This area is in the zone of discontinuous permafrost. Permafrost commonly is close to the surface in areas of the finer textured sediments throughout the MLRA. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and south-facing slopes on steep mountains. Periglacial features, such as pingos, thermokarst pits and mounds, ice-wedge polygons, and earth hummocks, are on the lower slopes and in upland valleys, particularly in the Davidson Mountains, in the northwestern part of the area.	**Soils:** Major soil resource concerns are erosion of the shallow soils on uplands and disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 2 percent of this MLRA. The most common miscellaneous areas are rock outcrop and rubble land (lakes make up less than 2 percent of the area). In many valleys placer mine tailings are common. Most of the landscape is mantled with bedrock colluvium and slope alluvium originating from the underlying bedrock.
Yukon Flats Lowlands (232)	300 to 1,000	This area is in the zone of discontinuous permafrost. Permafrost commonly is close to the surface in areas of the finer textured sediments on plains, stream terraces, and the more gently sloping footslopes and hills. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and near lakes and other water bodies.	**Soils:** Major soil resource concern is flooding. Most communities are in areas on the banks of the major rivers and streams where flooding is a severe hazard. The flooding is associated with spring snowmelt and runoff from the adjacent mountains, with ice jamming on rivers during periods of breakup, and occasionally with high-intensity summer thunderstorms. On permafrost-affected soils, disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 20 percent of this MLRA. The most common miscellaneous areas are riverwash and water (lakes make up approximately 20 percent of the area).
Bristol Bay-Northern Alaska Peninsula Mountains (236)	sea level to 2,500	This area is in the zone of discontinuous permafrost. Permafrost generally is at a considerable depth below the surface and occurs primarily in areas of the finer textured sediments on stream terraces, rolling uplands, and gently sloping footslopes. Isolated masses of ground ice occur in some areas of glacial drift and other unconsolidated materials. Permafrost generally does not occur on flood plains, near the coast, or in the southern part of the area.	**Soils:** Major soil resource concern is disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 14 percent of this MLRA. The most common miscellaneous areas are water, riverwash (particularly in the southwestern part of the MLRA), and beaches (lakes make up about 10 percent of the area). Moraines, drift, and glaciofluvial deposits cover approximately 60 percent of the area. Much of the area has been mantled with a layer of silty volcanic ash and loess of varying thickness from regional volcanoes and unvegetated flood plains and outwash plains.

Table B-14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions (*continued*)

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Ahklun Mountains (237)	sea level to 4,658	This area is in the zone of discontinuous permafrost. Isolated masses of permafrost are in areas of deep, unconsolidated deposits in the mountains. On lowlands, permafrost occurs as isolated masses primarily in areas of the finer textured materials. It generally does not occur on flood plains and near the coast.	**Soils:** There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up about 25 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and beaches (lakes make up about 5 percent of the area). Colluvium and slope alluvium lie across about 40 percent of the area. Glacial moraines and drift still cover approximately 45 percent of the area, primarily on the lower mountain slopes, valley bottoms, and coastal plains.
Western Brooks Range Mountains, Foothills, and Valleys (243)	20 to 8,570	This area is in the zone of continuous permafrost. In the mountains, permafrost is most evident in unconsolidated materials. In the valleys, thick layers of permafrost occur in both fine textured and coarse textured materials. Depth to the base of the permafrost layer may be 1,000 feet (305 meters) or more. In close proximity to water bodies, it may be 600 feet (185 meters) or more. Periglacial features, such as pingos, thermokarst pits, thaw lakes, gelifluction lobes, and high- and low-center polygons, are common on stream terraces, on the lower mountain slopes, and in swales on foothills.	**Soils:** Major soil resource concern is disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 27 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and water (lakes make up about 3 percent of the area). Mountain colluvium and alluvium, are found across about 60 percent of the present landscape. Slightly modified to highly modified glacial moraines, drift, and outwash deposits cover about 18 percent of the area.
Northern Brooks Range Mountains (244)	1,969 to 8,570	This area is in the zone of continuous permafrost. In the mountains, permafrost is most evident in areas of deep unconsolidated deposits. In valleys, thick layers of permafrost occur in both fine textured and coarse textured deposits. Periglacial features, including gelifluction lobes, polygons, and stripes, are common on stream terraces, on hills, and in gently sloping areas in the mountains.	**Soils:** Generally, no major resource concerns affect land use in this sparsely populated area. Because of the highways and pipeline that cross the area, however, disturbance of the fragile permafrost-affected soils is a concern. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 75 percent of this MLRA. The most common miscellaneous areas are rubble land, chutes, rock outcrop, and small glaciers (lakes make up less than 2 percent of the area). Mountain colluvium and alluvium cover about 75 percent of the present landscape. Slightly modified to highly modified glacial moraines, drift, and outwash deposits cover about 20 percent of the area.

Source: USDA 2006.

Sections 401 and 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands or other features regulated as waters of the United States. Potential development actions that may affect streams and/or wetlands require a permit from the USACE for dredging and filling in wetlands. Both the USACE and the ADEC have regulatory authority over actions in wetlands and floodplains. Actions in wetlands and floodplains require coordination with USACE and ADEC which may result in mitigation requirements.

The study area includes airspace associated with coastal areas of Alaska. Any operations in or adjacent to coastal areas would also be subject to the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.), as amended by the Coastal Zone Act Reauthorization Amendments of 1990 and PL 104-150, the Coastal Zone Protection Act of 1996. In addition, coastal activities may be subject to other specific regulations, including the Marine Protection, Research, and Sanctuaries Act (33 U.S.C. 1401 et seq.); the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 et seq.), as amended through 1997; and the Rivers and Harbors Act of 1899 (33 U.S.C. 403). The "Integrated Natural Resources Management" implementation of AFI 32-7064 (Air Force 2004a) directs that bases with coastal or marine properties must enter into an agreement with the Coastal American National Implementation Team to assist in the restoration and protection of coastal areas.

The State of Alaska, acting through the ADEC, also has authority to regulate statewide activities related to the management of surface and groundwater resources under the guidelines established by the abovementioned Federal regulations. The ADEC's authority is derived from legislation enacted as Title 18, Environmental Conservation, AAC. Relevant state regulations include: 18 AAC 70, *Water Quality Standards* (ADEC 2009a); 18 AAC 72, *Wastewater Disposal* (ADEC 2009b); and 18 AAC 80, *Drinking Water* (ADEC 2010b).

B.6.3 General Description of Affected Environment

B.6.3.1 Water Quality and Quantity

The study area for the proposed actions include portions of four major surface water drainage basins in the State of Alaska and portions of the Pacific Ocean in the Gulf of Alaska (GOA). Major rivers in the study area include the Yukon, Koyukuk, Tanana, Porcupine, Kuskokwim, and Susitna. Much of the average annual precipitation, ranging from 8 inches in the northeastern portion of the study area to 200 inches in the southern mountains, falls as snow and accumulates throughout the winter months (USDA 2006). During winter months, many bodies of water freeze completely, allowing heavy equipment and vehicles to traverse otherwise impassable areas. Thawing of the accumulated snow often leads to the flooding of rivers and streams. This frequent flooding contributes to the braided morphology of many Alaskan rivers as they flow across rather flat alluvial floodplains. Major surface water features in the JPARC study area are shown in Figure B-9.

The ocean waters of the GOA are generally in pristine condition because of the low intensity of use in this remote area (EPA 2004). The GOA forms a large, semicircular bight opening southward into the North Pacific Ocean. The GOA is characterized by a broad and deep continental shelf containing numerous troughs, seamounts, and ridges. The region receives high amounts of freshwater input, experiences numerous storms, and exhibits highly variable environmental conditions.

Surface water quality in the State of Alaska is generally good. The ADEC lists only 28 bodies of water within the planning area as not meeting minimum Federal water quality 303(d) criteria (ADEC 2010a). Primary sources of contamination are from mining operations, urban runoff, road construction, and fuel spills.

B.6.3.2 Water Resource

Groundwater in Alaska is largely provided by unconsolidated aquifers of sand and gravel that were deposited as alluvium or glacial outwash. Groundwater is available in most areas of Alaska, except where permafrost is very deep in the northern part of the state. Groundwater is a source of drinking water for about 50 percent of the overall state population and for 90 percent of the rural residents (ADEC 2010a). Primary aquifers are the Cook Inlet aquifer system, which provides water for Anchorage and for smaller cities and towns, including Palmer, Kenai, and Soldotna; the Tanana Basin Aquifer, water-yielding unconsolidated deposits along the Tanana River and the flanks of the hills that surround the river basin; and River-Valley alluvial aquifers, deposits of sand and gravel that are present in the floodplains and terraces of the major river valleys. These aquifers are present in lowland areas, primarily in the floodplains of major rivers, but in some places they also underlie low, rolling hills developed on alluvial-fan deposits that separate the floodplains from nearby mountains. In some areas, such as near Anchorage and Fairbanks, the unconsolidated-deposit aquifers are thick and widespread; in other places, they are present as narrow bands of alluvium in, and adjacent to, river channels. Because Alaska's major population centers and most agricultural development are in lowland areas near rivers, unconsolidated-deposit aquifers are an important source of water for public supply, domestic and commercial uses, and agriculture (USGS 1999).

B.6.3.3 Floodplains

There is limited detailed mapping of the 100-year floodplain throughout the study area that could potentially be affected by the proposed actions. Geographic information system (GIS) data of the surface water features and topography can provide the approximate locations of floodplains. Flooding commonly occurs around rivers and streams, in areas of snow or ice accumulation and in low-lying coastal areas. Melt water from snow and glaciers often causes streams to overflow their banks during spring and summer months in Alaska. Ice jams, which are created when chunks of ice pile up and form a dam, may exacerbate flooding. Ice jams can occur at any location along any river, but are particularly common at and near the towns of Eagle, Circle, and Fort Yukon (NOAA 2006). Coastal flooding resulting from strong and sustained southerly winds is a common problem along the southern coast of Alaska; however, floodplains are generally present in areas of low elevation immediately surrounding most rivers and streams.

B.6.3.4 Wetlands

Wetlands are extremely common in Alaska; there are an estimated 174,683,900 acres of wetlands, accounting for approximately 42 percent of the total surface area (ADEC 2010a). In many areas, permafrost just beneath the surface of the ground traps water, leading to the formation of wetlands. Other wetlands form as a result of heavy rainfall, meltwater inputs, beavers, and tides. In addition to permafrost areas, extensive wetlands are typically associated with, or are adjacent to, water systems such as rivers where topographic lows cause groundwater to be closer to the surface; however, wetlands can also occur where a barrier prevents surface water from percolating or where there is a hydrologic connection to ground or surface water.

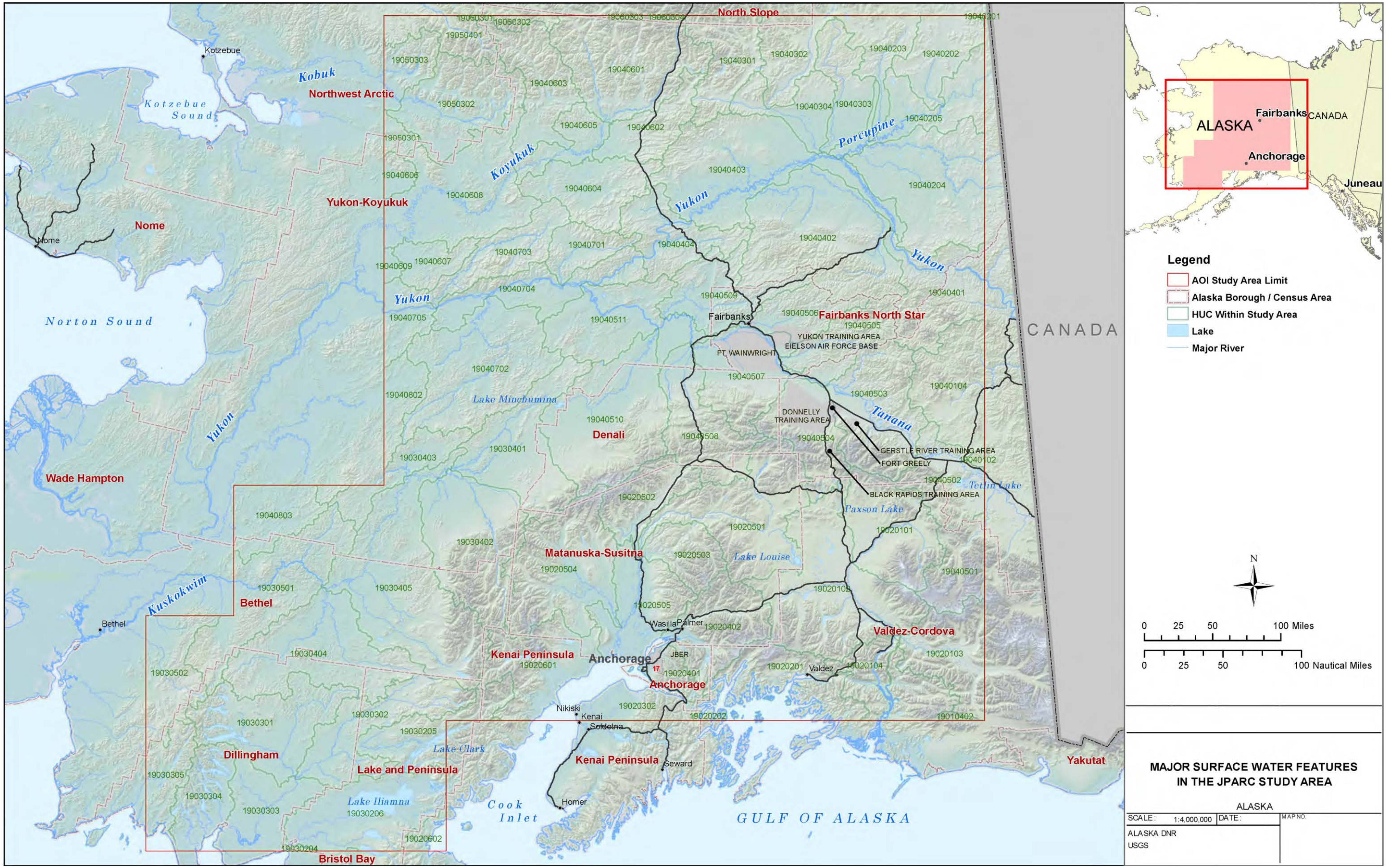


Figure B-9. Major Surface Water Features in Central Alaska

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B.7 HAZARDOUS MATERIALS AND WASTE

B.7.1 Definition of Resource

The terms "hazardous materials" and "hazardous waste" refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Solid Waste Disposal Act (SWDA), as amended by the Resource Conservation and Recovery Act (RCRA) or the Toxic Substance Control Act (TSCA). In general, hazardous materials include substances that, based on quantity, concentration, or characteristics (physical, chemical, or infectious), may present substantial danger to public health or the environment when released into the environment. Hazardous wastes regulated under RCRA are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as a hazardous waste under 40 CFR 261.

Issues associated with hazardous materials and waste typically center around waste streams; underground storage tanks (USTs); aboveground storage tanks (ASTs); and the storage, transport, use, and disposal of pesticides, fuels, lubricants, and other industrial substances. When such materials are improperly used in any way, they can threaten the health and well-being of wildlife species, habitats, and soil and water systems, as well as humans. In addition, the expenditure of live ammunition or detonations has the potential to release hazardous chemicals or other elements, such as heavy metals, into the environment.

B.7.2 Regulatory Setting

Federal, state, Air Force, and Army regulations determine requirements for hazardous materials and waste. These criteria differ based on the type and context of the material or waste in question.

Federal Regulations. The management of hazardous materials and hazardous waste is governed by specific Federal regulations and environmental statutes. The key regulatory requirements include the following:

Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.). RCRA is relevant to the management of hazardous waste from point of generation to its disposal. RCRA requirements include the tracking and storage of hazardous waste and the enforcement of safe management practices. The main focus of RCRA is to prevent the release of petroleum products and hazardous substances.

Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11001–11050). EPCRA requires emergency planning for areas where hazardous materials are manufactured, handled, or stored, and provides citizens and local governments with information regarding potential hazards to their community.

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 9601 et seq.), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (42 U.S.C. 9601–9675). CERCLA (also known as Superfund) addresses the management of existing contaminated sites and acts as the governing regulation of remediation practices. CERCLA provides for oversight of remediation actions for contaminated or potentially contaminated sites by requiring investigation, assessment, and development of remediation programs to contain contamination. CERCLA requires removal of hazardous substances for emergency response and long-term monitoring of contamination levels at applicable sites. Section 105(a)(8)(B) of CERCLA, as amended, requires that the statutory criteria provided by the Hazard Ranking System be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. This list is known as the

National Priorities List (NPL). SARA amended CERCLA by including mandatory cleanup standards, settlement provisions, and guidelines for state and public participation.

Community Environmental Response Facilitation Act of 1992 (CERFA) (42 U.S.C. 9620). This act amended CERCLA, requiring agencies to identify real property where hazardous wastes were stored released or disposed of prior to the Federal Government terminating its activities on property it owns.

Toxic Substance Control Act of 1976 (15 U.S.C. 2601 et seq.). The TSCA enforces management of harmful or potentially harmful substances. It requires the testing of chemicals that could be harmful to humans or the environment, imposes limits on the availability of certain substances, and establishes guidelines and programs for the safe management of chemicals.

Asbestos Hazard Emergency Response Act (AHERA) (15 U.S.C. 2651). AHERA regulates hazardous forms of asbestos, including their inspection, transport, and disposal, as well as the post-remediation surveillance of asbestos-related activities.

Spill Prevention, Control, and Countermeasure (SPCC) Rule (40 CFR 112). The SPCC Rule regulates oil discharges through specific requirements for oil spill prevention, preparedness, and response. It provides for oversight of management practices and contamination response programs with a view to limiting contact with, and exposure of the environment, wildlife, and humans to, petroleum products.

EPA Regulation on Identification and Listing of Hazardous Waste (40 CFR 261). This regulation identifies solid wastes subject to regulation as hazardous and as subject to specific notification requirements under RCRA.

EPA Regulation on Standards for the Management of Used Oil (40 CFR 279). This regulation delineates requirements for storage, processing, transport, and disposal of oil that has been contaminated by physical or chemical impurities during use.

EPA Regulation on Designation, Reportable Quantities, and Notification (40 CFR 302). This regulation identifies reportable quantities of substances listed in CERCLA and sets forth notification requirements for releases of those substances. It also identifies reportable quantities for hazardous substances designated in the CWA.

Clean Water Act (40 CFR 122, Section 402). As authorized by the CWA, the NPDES permit program controls water pollution by regulating point and nonpoint sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Nonpoint source pollution can be caused by either rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and man-made pollutants, finally depositing those pollutants into lakes, rivers, wetlands, coastal waters, and groundwater. NPDES regulations include measures to prevent such pollution, including runoff of petroleum waste and hazardous waste into receiving water bodies. The NPDES permit program is administered by the State of Alaska through the ADEC.

Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR Parts 150 – 189). FIFRA mandates that EPA regulate the use and sale of pesticides to protect human health and preserve the environment. EPA is specifically authorized to: 1) strengthen the registration process by shifting the burden of proof to the chemical manufacturer, 2) enforce compliance against banned and unregistered products, and 3) promulgate the regulatory framework missing from the original law, which simply established procedures for registering pesticides with the U.S. Department of Agriculture and established labeling procedures. FIFRA provides EPA with the authority to oversee the sale and use

of pesticides; however, because FIFRA does not fully preempt state/tribal or local law, each state/tribe and local government may also regulate pesticide use.

State Regulations. The State of Alaska, acting through the ADEC, also has authority to regulate the handling, storage, transport, and disposal of hazardous materials and waste within the proposed action areas. The ADEC's authority is derived from legislation enacted as Title 18, Environmental Conservation, AAC. In addition to its Title 18 authority, the ADEC has oversight responsibility of DoD CERCLA sites. Applicable ADEC regulations include the following: 18 AAC 62, *Hazardous Waste* (ADEC 2003); 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2008); 18 AAC 75.341, *Soil Cleanup Levels; Tables*; 18 AAC 75.445[k], *Best Available Technology Review*; and 18 AAC 78, *Underground Storage Tanks* (ADEC 2006).

Department of Defense. The DoD program for remediating contamination on military lands is the Installation Restoration Program (IRP). In 2012, the responsibilities of the IRP will transfer to the Military Munitions Response Program (MMRP), which is a subset of the Defense Environmental Restoration Program (DERP), and will be the primary program responsible for the restoration of DoD contaminated sites after 2012. The MMRP was established to better reflect the statutory goals established by the DoD in its Environmental Restoration Program. The MMRP will address potential explosives safety, as well as health and environmental issues caused by past DoD munitions-related activities. The scope of DERP includes cleanup and restoration of sites contaminated with toxic and hazardous substances, low-level radioactive materials, petroleum, oils, lubricants, and other pollutants and contaminants.

Another subset of the MMRP and DERP is the Formerly Used Defense Sites (FUDS) Program, which cleans up properties formerly owned, leased, possessed, or used by the military services, including Army, Navy, Air Force, or other DoD agencies. Under the FUDS Program, the DoD is authorized to clean up contamination, address military munitions, and to remove building/debris safety hazards caused by DoD on properties that were under the jurisdiction of the Secretary of Defense prior to October 17, 1986. The FUDS Program uses a cleanup process consistent with CERCLA and completes work on a prioritized basis, with the sites posing the highest risk being remediated first. The Army is the executive agent for the program and U.S. Army Corps of Engineers manages and directs the program administration.

Air Force Instructions. Several Air Force Instructions address the management and safe handling of hazardous waste and materials in accordance with applicable Federal and state regulations. These include the following:

- AFI 32-7086, *Hazardous Material Management* (Air Force 2004b). AFI 32-7086 provides guidance in managing the procurement and use of hazardous materials (1) to support Air Force missions; (2) to protect the safety and health of personnel on Air Force installations and communities surrounding Air Force installations by ensuring proper hazardous material management; (3) to minimize Air Force use of hazardous materials consistent with mission requirements; and (4) to maintain Air Force compliance with Federal and state environmental requirements for hazardous materials usage.
- AFI 32-7042, *Solid and Hazardous Waste Compliance* (Air Force 2009). AFI 32-7042 identifies compliance requirements for all solid and hazardous waste except radioactive waste.
- AFI 32-1052, *Facility Asbestos Management* (Air Force 1994b). AFI 32-1052 establishes requirements and assigns responsibilities to incorporate facility asbestos management principles and practices into all Air Force programs. It also establishes a program to ensure compliance with 40 CFR 61.14O, National Emission Standard for Asbestos, and 29 CFR 1926.58, Asbestos Construction Standards.

Army Regulations. AR 200-1, *Environmental Protection and Enhancement* (Army 2007b), regulates how military or civilian personnel, tenants on post, and contractors at Army facilities handle hazardous materials and manage regulated waste. AR 200-1 provides guidance on, but is not limited to, policies addressing the following areas: oil and hazardous substance spills, hazardous materials management, hazardous and solid-waste management, lead-based paint management, asbestos management, radon reduction program, and the IRP. Individual installations may apply regulations in addition to AR 200-1 that are not designed to supersede, but rather work as a compliment to, the policies and procedures established by it.

B.7.3 General Description of Affected Environment

B.7.3.1 Contaminated Sites

EPA lists six sites within the areas potentially affected by the proposed actions as CERCLA Superfund sites on the NPL (EPA 2011). Of these, four sites (Eielson AFB, Elmendorf AFB, Joint Base Elmendorf-Richardson, and Fort Wainwright) occur within JPARC military installations. These installations were placed on the NPL because of contamination found mainly within their cantonment areas. These sites will be discussed in further detail in Chapter 3.

There are 2,043 contaminated sites listed on the ADEC database within the areas potentially affected by the proposed actions. The locations of these sites are shown on Figure B-10. Of these, 489 sites occur on DoD lands within the proposed action areas and 25 on military training areas within the proposed action areas. Fourteen of the 25 sites have completed the remediation process; the other 11 are still open (ADEC 2011b).

The following summarizes contaminated sites in training areas included in the proposed actions.

Tanana Flats Training Area. TFTA, which occupies 653,746 acres of the Middle Tanana River Basin, is due south of Fort Wainwright and due west of Eielson AFB. Two contaminated sites within TFTA are listed in the ADEC contaminated site database: the Blair Lakes Training Area (discussed below) and a site near the southern border of TFTA.

Blair Lakes Training Area. The Blair Lakes Training Area, a 63,100-acre tract within TFTA, is used by the Air Force under a joint use arrangement. The Air Force's Land Use Permit provides exclusive use of a 33,963-acre portion of the tract, designated R-2211, and joint use of the remaining 29,137 acres. The training area is 26 miles southwest of Eielson AFB and 32 miles due south of Fairbanks. Five sites on the Blair Lakes Range were identified and addressed under the DoD IRP program in the early 1990s, and a ROD was signed in 1995. There are no active sites listed in the ADEC contaminated sites database. The Blair Lakes Training Area is bounded on the north, east, and west by TFTA, and on the south by MMRP site FTWW-008-R-01, a former bombing range.

Donnelly Training Area–East. DTA-East is not listed on the NPL; however, one site in DTA-East is listed on the ADEC contaminated sites database. There is also potential for the presence of UXO and associated hazardous waste residues, as the area was used as an Arctic training and test area by Fort Greely.

Donnelly Training Area–West. DTA-West is not listed on the NPL; however, four sites in the DTA-West are listed on the ADEC contaminated sites database. There is a potential for the presence of UXO and associated hazardous waste residues, as the area was used as an Arctic training and test area under Fort Greely.

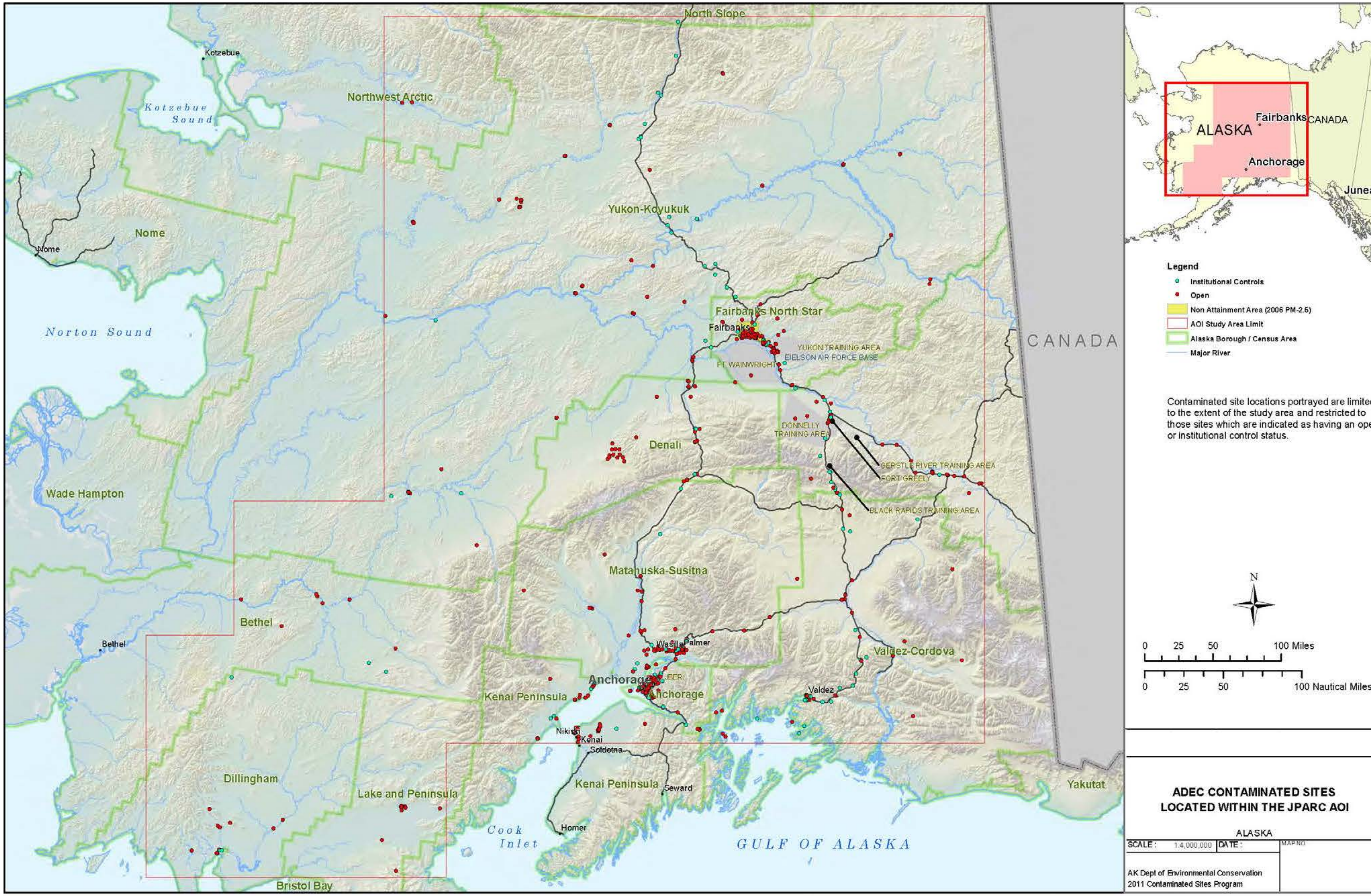

Figure B-10. Contaminated Sites in Central Alaska

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Yukon Training Area. YTA lies directly east of Eielson AFB and contains one site listed in the ADEC contaminated sites database.

Fort Greely. Fort Greely is a 6,805-acre installation east of DTA in the east-central portion of Alaska. There are 47 sites in Fort Greely listed on the ADEC database. Of these 47 sites, 38 are currently open and the remaining 9 are listed as closed with institutional controls (ADEC 2011b).

B.7.3.2 Munitions-Related Residue

CHAFF AND FLARE

Chaff and defensive flares are currently used by 11th AF crews in existing MOAs and ATCAAs and are managed as ordnance. Use is governed by detailed operating procedures to ensure safety. The Air Force restricts flare use in Alaskan airspace to altitudes above 5,000 feet AGL from June through September and to altitudes above 2,000 feet AGL for the rest of the year. These altitude restrictions substantially reduce any risk of a fire from training with defensive flares.

Chaff, which is ejected from an aircraft to reflect radar signals, consists of fibers of aluminum-coated silica thinner than human hair packed into approximately 4-ounce bundles. When ejected, chaff forms a brief electronic “cloud” that temporarily masks the aircraft from radar detection. Although the chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive (Air Force 1997). Depending on the chaff used, plastic or nylon pieces, a felt piece, or 2- by 3-inch squares of parchment paper can fall to the ground with each released chaff bundle.

Each defensive flare consists of small pellets of highly flammable material that burn rapidly at extremely high temperature. Flares provide a heat source, other than the aircraft’s engine exhaust, to decoy heat-sensitive or heat-seeking targeting systems. The flare ignites upon ejection from the aircraft and burns completely within approximately 3.5 to 5 seconds, or approximately 400 to 500 feet from its release point (Air Force 1997).

MUNITIONS

The Air Force and Army currently conduct a number of training missions in impact areas that generate munitions-related residue. In general, munitions-related residue sources include practice bombs, expended artillery, small arms and mortar projectiles, bombs and missiles, rockets and rocket motors, grenades, incendiary devices, experimental items, demolition devices, and any other material fired on or upon a military range.

Munitions that fail to detonate properly (duds) and munitions that only partially detonate (low-order detonations) can result in the deposition of munitions residues (explosives and metals) at impact sites. Duds and low-order detonations have the potential to create environmental contamination by the leaching of explosive filler into soil, sediment, surface water, and groundwater.

The expenditure of live ammunition or detonations has the potential to release hazardous chemicals or other elements, such as heavy metals, into the environment. The existing condition is considered to be the baseline levels released into the environment from current training and testing missions in the impact areas.

B.8 BIOLOGICAL RESOURCES

B.8.1 Definition of Resource

Biological resources consist of native or naturalized plants and animals, along with their habitats, including wetlands. Although the existence and preservation of biological resources are intrinsically

valuable, these resources also provide essential aesthetic, recreational, and socioeconomic benefits to society. The analysis focuses on plant and animal species and vegetation types that are important to the functioning of local ecosystems, are of special societal importance (e.g., as subsistence or game species), or are protected under Federal or state law.

B.8.2 Regulatory Setting

The Endangered Species Act. The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531–1544, as amended) established measures for the protection of plant and animal species that are Federally listed as threatened and endangered, and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the effects of their proposed actions through a set of defined procedures, which can include the preparation of a Biological Assessment (BA) with formal consultation with the USFWS and/or the National Marine Fisheries Service (NMFS) under Section 7 of the ESA. The USFWS has primary management responsibility for terrestrial and freshwater species, while the NMFS has primary responsibility for marine species and anadromous fish species (species that migrate from saltwater to freshwater to spawn).

Compliance with the ESA requires communication and consultation with the USFWS and/or NMFS in cases where a Federal action could affect listed threatened or endangered species, species proposed for listing, or candidates for listing. The primary focus of this consultation is to ensure that proposed actions are not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of a critical habitat. If any listed or proposed species are present, a determination of the potential effects on the species is made through the EIS process. Potential effects would be further analyzed by the preparation of a BA. Should no species protected by the ESA be potentially affected by the proposed action, no additional action would be required.

The Marine Mammal Protection Act. Proposed activities that occur in coastal and open water areas may also be affected by the Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. 1361 et seq.), as amended through 1997. The MMPA established a Federal responsibility to conserve marine mammals and associated essential habitats in U.S. waters, by placing, with limited exceptions including for military readiness activities, a moratorium on the “taking” of marine mammals in waters or on lands under U.S. jurisdiction. Management of the MMPA is vested in the U.S. Department of Commerce (NMFS, also known as National Oceanic and Atmospheric Administration (NOAA) Fisheries) for cetaceans (whales and dolphins) and for pinnipeds (seals and sea lions) other than walrus. The DOI agency USFWS is responsible for all other marine mammals, including sea otter, walrus, polar bear, dugong, and manatee. The MMPA generally assigns identical responsibilities to the Secretaries of the two Departments.

The Migratory Bird Treaty Act. The Migratory Bird Treaty Act (MBTA) governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The take of all migratory birds is governed by the MBTA’s regulation that affects educational, scientific, and recreational purposes, and accordingly limits the harvest to levels that prevent overuse. The MBTA also prohibits the export, selling, purchase, barter, or offering for sale, purchase, or barter of any migratory bird, its eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11).

The Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald or golden eagles. “Taking” is described to include their parts, nests, or eggs, molesting, or disturbing the birds. In addition to direct actions on the birds, the Act also covers disturbance that may result from human-induced changes to the traditional nest sites as such changes may interfere or interrupt their normal behavior and cause them to abandon their nests (16 U.S.C. 668-668d).

EO 13186. *Responsibilities of Federal Agencies to Protect Migratory Birds*, outlines the responsibilities of Federal agencies to protect migratory birds, in accordance with the MBTA, the Bald and Golden Eagle Protection Acts, the Fish and Wildlife Coordination Act, ESA, and NEPA. This order accomplishes the following:

- Specifies the USFWS as the lead for coordinating and implementing EO 13186
- Requires Federal agencies to incorporate migratory bird protection measures into their activities
- Requires Federal agencies to obtain permits from USFWS before any "take" occurs, even when the agency's intent is not to kill or injure migratory birds

The Clean Water Act. The CWA and the EPA Storm Water General Permit regulate pollutant discharges. Section 404 of the CWA and EO 11990, Protection of Wetlands, regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands (e.g., road construction) require notification of the USACE and authorization for dredging and filling in wetlands under a nationwide or regional permit.

The Sikes Act. The Sikes Act (16 U.S.C. 670a) applies to Federal land under DoD control and, among other things, requires military services to establish INRMPs to conserve natural resources on military installations. The INRMPs include inventories and evaluations of threatened and endangered species, other fish and wildlife resources, wetlands, migratory bird habitat, and forest lands on each installation. INRMPs include an assessment of impacts of military activities on natural resources and describe means to mitigate these impacts. The Fish and Wildlife Cooperative Plan is the component of the INRMP that describes how the fish and wildlife resources at an installation will be managed. It is a cooperative agreement between the Sikes Act's required partners: the installation, the USFWS, and the Alaska Department of Fish and Game (ADFG). The plan provides a program for the development, maintenance, and coordination of wildlife, fish, and game conservation (USARAK 2006b). This program includes habitat improvements or modifications, wildlife considerations in all range rehabilitation, control of off-road vehicle traffic, consumptive and nonconsumptive use and protection of fish and wildlife resources, natural resources law enforcement requirements, and designated responsibilities for the control and disposal of feral animals.

Additionally, USARAK Regulation 350-2 (USARAK 2011), *Range Safety*; AR 200-1, *Environmental Protection and Enhancement* (Army 2007b); AR 200-2, *Environmental Effects of Army Actions* (Army 1988); and AR 200-3, *Natural Resources – Land, Forest, and Wildlife Management* (Army 1995), provide procedures for protecting vegetation on lands used by the Army.

B.8.3 General Description of Affected Environment

B.8.3.1 Vegetation and Wildlife

B.8.3.1.1 Ecoregions

Ecoregions, as developed by Nowacki et al. (2001), provide a way to describe broad-scale characteristics of terrestrial environments. Ecoregions in the area potentially affected by the proposed actions (shown in Figure B-11) reflect the relationships between abiotic conditions (e.g., radiant energy, moisture, nutrients, disturbance) in a region and the flora and fauna supported by that region (USACE 2003). The area potentially affected by the proposed actions includes portions of 17 ecoregions.

The nine military installations within the area potentially affected by the proposed actions occur almost entirely within three ecoregions, the Yukon-Tanana Uplands, Tanana-Kuskokwim Lowlands, and the Cook Inlet Basin, with a small portion overlapping the Chugach-St. Elias Mountains. Dominant plant species and typical wildlife of these four ecoregions are presented in Figure B-11 and described below.

Table B–15. Ecoregions by Installation in the Areas Potentially Affected by the Proposed Action

Broad Regional Type	Major Vegetation Community	Ecoregion	Dominant Plant Species or Associations	Typical Wildlife (representative species)	Installations Present
Boreal	Intermontane Boreal	Yukon-Tanana Uplands	White spruce, birch, aspen, black spruce, low shrubby birch, and lichen tundra in higher elevations	Caribou, moose, snowshoe hare, marten, lynx, black bear, brown bear, peregrine falcon, salmon	Eielson AFB, Yukon TA
		Tanana-Kuskokwim Lowlands	Bog, fens, sedges, black spruce, white spruce, balsam poplar, aspen, white birch, alder	Moose, black bear, beaver, porcupine, trumpeter swan, waterfowl	Donnelly TA, Fort Wainwright, Tanana Flats TA, Blair Lakes Range, Gerstle River TA
	Alaska Range Transition	Cook Inlet Basin	Black spruce, white spruce, Sitka spruce, aspen, birch, willow, alder	Trumpeter swan, shorebirds, Dolly Varden, whitefish, moose, black bear, beaver, muskrat	JBER
Maritime	Coastal Rainforests	Chugach-St. Elias Mountains	Alpine communities of sedges, grasses, and low shrubs in high elevations; alder shrublands and mixed forests in lower elevations	Dall sheep, hoary marmot, pika, ptarmigan, moose, brown bear, black bear, beluga whales	JBER TMAA

Key: AFB=Air Force Base; TA=training area; JBER=Joint Base Elmendorf-Richardson; TMAA=Temporary Maritime Activities Area.
Source: Nowacki et al. 2001.

Scientific names will be provided at first use, according to the USDA PLANTS database for plant species and Integrated Taxonomic Information System (ITIS) website for animals.

Yukon-Tanana Uplands. The broad, rounded mountains of moderate height within the Yukon-Tanana Uplands are affected by a strongly continental climate, with warm summers and very cold winters (Nowacki et al. 2001). Vegetation is dominated by white spruce (*Picea glauca*), birch (*Betula* spp.), and aspen (*Populus tremuloides*) on south-facing slopes; black spruce (*Picea mariana*) on north-facing slopes; and black spruce woodlands and tussock and scrub bogs in valley bottoms. Floodplains of headwater streams support white spruce, balsam poplar (*Populus balsamifera*), alder (*Alnus* spp.), and willows (*Salix* spp.). Above the treeline, low shrubby birch and lichen tundra dominate. This area has the highest incidence of lightning strikes in Alaska and the Yukon Territory, causing frequent forest fires. Caribou (*Rangifera tarandus*), moose (*Alces alces*), snowshoe hare (*Lepus americanus*), marten (*Martes americana*), lynx (*Lynx canadensis*), black bear (*Ulnus americanus*), and brown bear (*U. arctos*) are plentiful. The area's abundant cliffs provide important habitat for peregrine falcons. The clear headwater streams are important spawning areas for three salmon species: Chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*), and coho (*O. kisutch*).

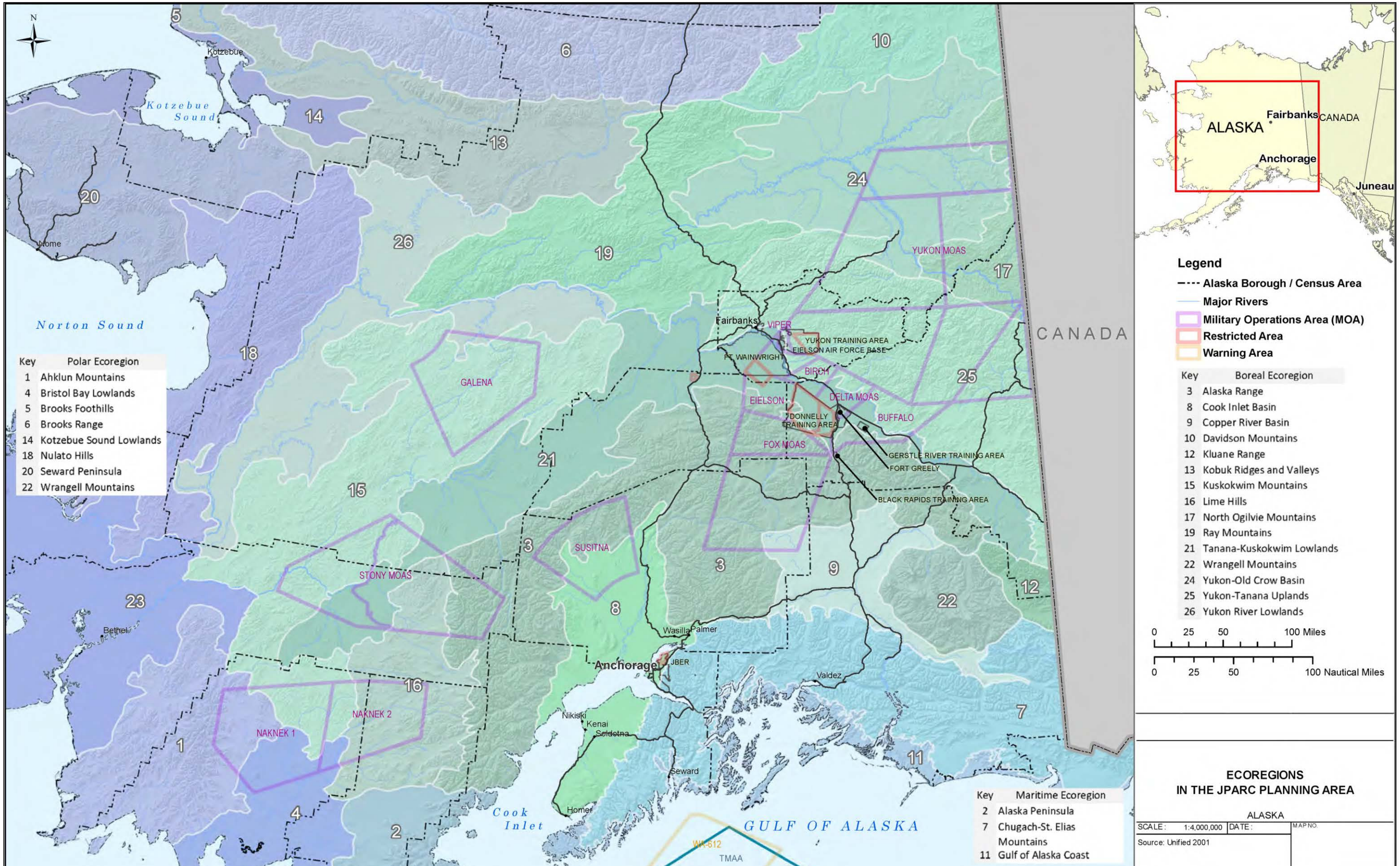

Figure B-11. Ecoregions in Central Alaska

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Tanana-Kuskokwim Lowlands. The Tanana-Kuskokwim Lowlands is an alluvial plain that slopes gently northward from the Alaska Range (Nowacki et al. 2001). A dry continental climate prevails, with cool summers and cold winters. Even though a rain shadow exists due to the neighboring Alaska Range, surface moisture is rather abundant due to the gentle topography, patches of impermeable permafrost, and poor soil drainage. Bogs and fens caused by retreating permafrost are frequent and may be expected to increase in number and size with continuing climate warming (Nowacki et al. 2001). Streams flowing across these lowlands ultimately drain into one of two large river systems, the Tanana or Kuskokwim. Boreal forests dominate the landscape, with black spruce in bogs; white spruce and balsam poplar along rivers; and white spruce, white birch, and aspen on south-facing slopes. The coldest, wettest areas on permafrost flats support birch, heath shrubs, and sedge tussocks. Tall willow, birch, and alder communities are scattered throughout. The mosaic of wet habitats is ideal for moose, black bear, beaver (*Castor canadensis*), porcupine (*Erethizon dorsatus*), trumpeter swan (*Cygnus buccinator*), and numerous other waterfowl.

Cook Inlet Basin. This gently sloping lowland contains numerous lakes, ponds, and wetlands that attract large numbers of waterfowl (including trumpeter swans) and shorebirds (Nowacki et al. 2001). Several river systems support recovering salmon runs and the bears, bald eagles (*Haliaeetus leucocephalus*) and ravens (*Corvus corax*) that prey on them. A mix of maritime and continental climates prevails, with moderate fluctuations of seasonal temperature and abundant precipitation. This climate, coupled with the flat to gently sloping organic soils, supports black spruce forests and woodlands along with heath shrubs in open bogs. Mixed forests of white and Sitka spruce (*Picea sitchensis*), aspen, and birch grow on better-drained sites and grade into tall shrub communities of willow and alder on slopes along the periphery of the basin. A mixture of wetland habitats supports numerous moose, black bears, beavers, and muskrats (*Ondatra zibethicus*).

Chugach-St. Elias Mountains. This ecoregion consists of the largest collection of icefields and glaciers found on the globe outside the polar regions (Nowacki et al. 2001). This mountainous region intercepts an abundance of maritime moisture, mainly in the form of snow. In the summer, glacial meltwaters join vast amounts of water draining onto coastal flats. Some glaciers run all the way to tidewater. The sheer height of these mountains, together with their expansive icefields, serves to isolate the wildlife species that occur in the interior, with the only connective corridors along the Alsek and Copper River corridors. Alpine vegetation communities of sedges, grasses, and low shrubs support high-elevation species such as Dall sheep, mountain goats (*Oreamnos americanus*), hoary marmots (*Marmota caligata*), pikas (*Ochotona princeps*), and ptarmigans (*Lagopus* spp.). Where glaciers and icefields have receded, broad U-shaped valleys occur, many with sinuous lakes. Alder shrublands and mixed forests grow on lower slopes and valley floors where moose and brown and black bear forage.

Copper River Basin. This mountain basin lies within the former bed of Glacial Lake Ahtna on fine-textured lacustrine deposits ringed by coarse glacial tills. The basin is a large wetland complex underlain by thin to moderately thick permafrost and pockmarked with thaw lakes and ponds. A mix of low shrubs and boreal black spruce forests and woodlands grows in the wet organic soils (Nowacki et al. 2001). The extensive boreal forests in the project region are prone to wildfire, the potential extent of which is increased with direct and indirect effects of global warming and fuel buildup (Chapin et al. 2008). The forests are adapted to and require recurring fire, however, caribou tend to avoid winter habitat burned in the last 50–60 years because of a lack of adequate lichen abundance due to the slow pace of lichen regeneration after fire (Rupp et al. 2006) compared to regeneration of other boreal forest vegetation. Cottonwood, willow, and alder line rivers and streams as they braid or meander across the basin. Spring floods are common along drainages. Arctic grayling, burbot, and anadromous sockeye salmon are common fishes. Black and brown bears, caribou, wolverines, and ruffed grouse are present throughout these wetland habitats. The climate is strongly continental, with steep seasonal temperature variation. The basin acts as a cold-air sink, and winter temperatures can be bitterly cold.

B.8.3.1.2 Wildlife

Extraordinary in abundance and diversity, the vast numbers of wildlife species that occur in interior Alaska are some of the most important natural resources in the state. Most of the common large mammal species listed above by ecoregion (moose, brown and black bear, caribou, lynx) are considered big game and are hunted and/or trapped in Alaska, providing a source of recreation, subsistence, and substantial economic value for the state. Wildlife habitats sensitive to disturbance that occur within the areas potentially affected by the proposed actions are discussed below and in more detail in Chapter 3 under specific alternatives.

Mammals. Medium-size to small mammals found throughout interior Alaska include red fox (*Vulpes vulpes*), snowshoe hare, marten, red squirrel (*Tamiasciurus hudsonicus*), beaver, muskrat, mink (*Neovison [=Mustela] vison*), bats, such as little brown bat (*Myotis lucifugus*), and various voles and mice. Many of these animals are also hunted or trapped recreationally and for subsistence, and they too represent a significant economic resource. Subsistence hunting is described in more detail in Section B.13.

Bird Species. Common upland bird species that occur in interior Alaska year-round include spruce grouse (*Falcipennis canadensis*), ruffed grouse (*Bonasa umbellus*), and ptarmigan. Common breeding birds in the region that are present in spring and summer include alder flycatcher (*Empidonax alnorum*), chickadee (*Poecile* spp.), gray jay (*Perisoreus canadensis*), Swainson's thrush (*Catharus ustulatus*), myrtle warbler (*Dendroica coronata*), and slate-colored junco (*Junco hyemalis*). Olive sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*), and blackpoll warbler (*Dendroica striata*) are common within JPARC training areas and are considered "sensitive" by DoD Partners in Flight. Summer resident raptors in interior Alaska include northern goshawk (*Accipiter gentilis*), sharp-shinned hawk (*A. striatus*), great horned owl (*Bubo virginianus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), bald eagle, and American kestrel (*Falco sparverius*). These birds of prey primarily hunt the small mammals, rodents, and smaller birds of the region. Bald eagles feed on waterfowl, carrion, and fish as well. (Figure B-12 depicts the known eagle nests in the ROI.) Raptor populations in Alaska fluctuate annually in response to prey abundance and other environmental factors.

Fish and Aquatic Resources. At least five salmon species plus other sought-after game fish (e.g. Arctic char [*Salvelinus alpinus*], grayling [*Thymallus arcticus*], northern pike [*Esox lucius*], rainbow trout [*Oncorhynchus mykiss*], and Dolly Varden [*Salvelinus malma*]) breed within the many rivers and creeks that occur in the area potentially affected by the project. Fish resources are important as a wildlife food source as well as for human recreation and consumption. The aquatic resources available in the region are vital for the millions of migratory waterfowl of various species that use the wetlands for resting, stopover feeding, and to breed within the area potentially affected by the project. Waterfowl, in turn, are important to recreational and subsistence hunters.

Wildlife Travel Routes. Wildlife travel routes or corridors serve as important connections between habitats, their usage varying from daily movements of animals following the availability of food sources and cover to seasonal migration patterns across vast regions. Wildlife corridors can provide access to resources or habitat necessary for life stages such as breeding, the bearing of young, wintering, or hibernation. Wildlife movements along typical corridors usually fall into one of three categories: (1) dispersal (i.e., juvenile animals moving from natal areas or individuals extending their range); (2) seasonal migration, which can include searching for mates, breeding areas, and shelters for hibernation; and (3) local movements related to home range activities (foraging for food or water, defending territories, or locating cover). The data available on the project area includes routes used by caribou to migrate to and from seasonal ranges, as depicted in Figure B-13. Adverse impacts on wildlife travel routes can often be avoided by seasonally restricting when people and/or vehicles are in those areas. Also, the siting of new construction should avoid cutting off or blocking wildlife travel routes.

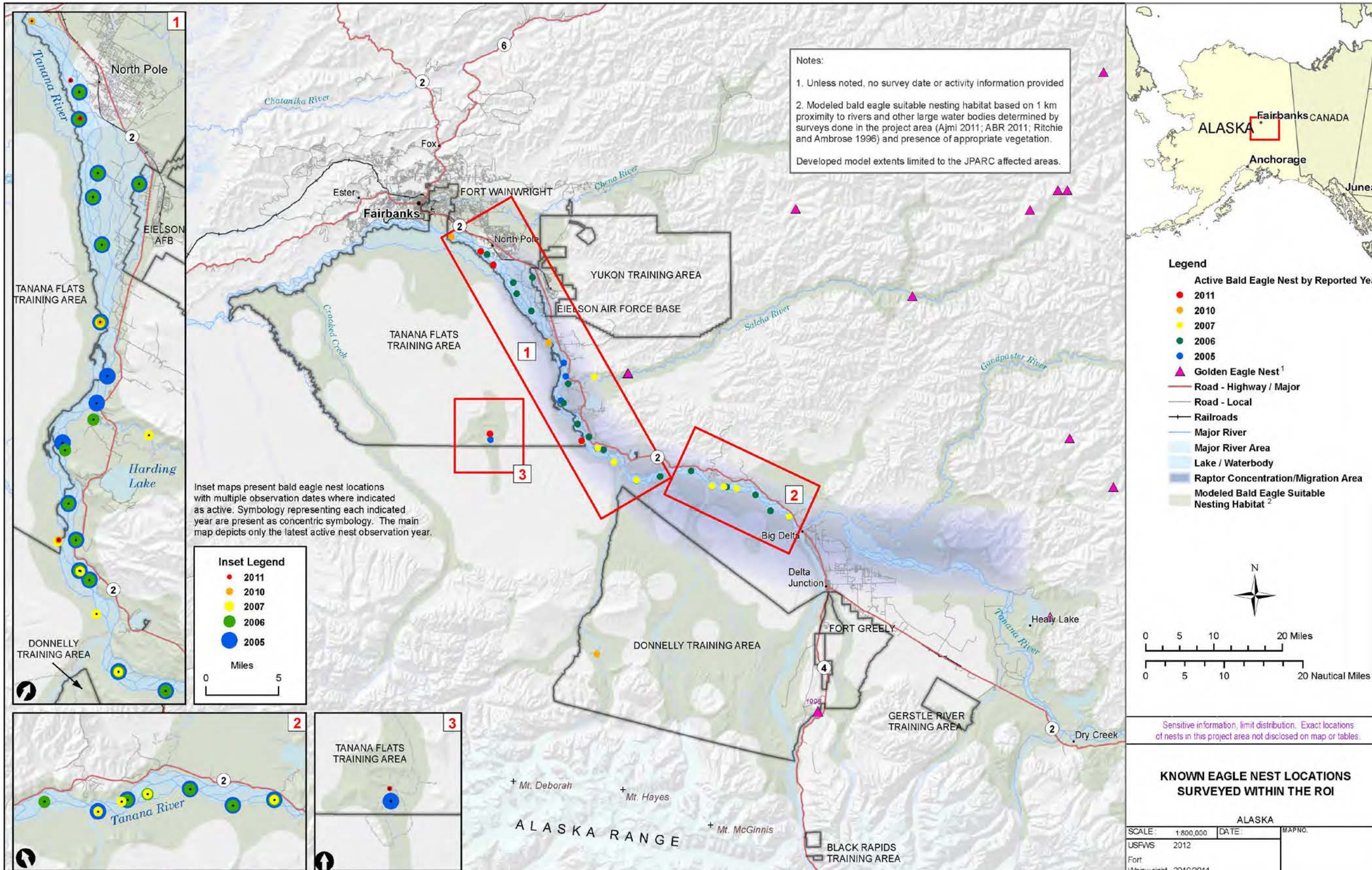


Figure B-12. Known Eagles Nests in the Region of Influence

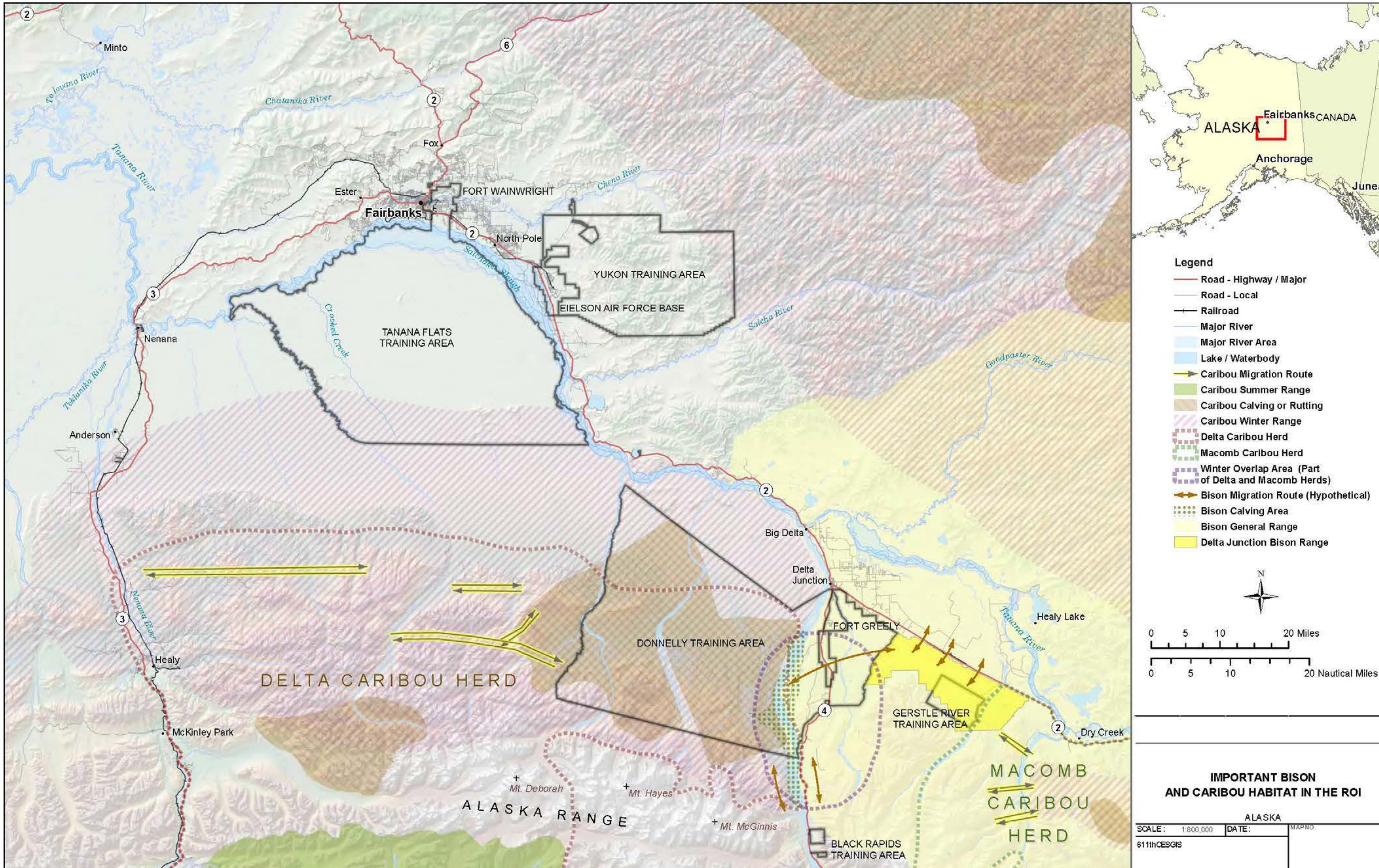
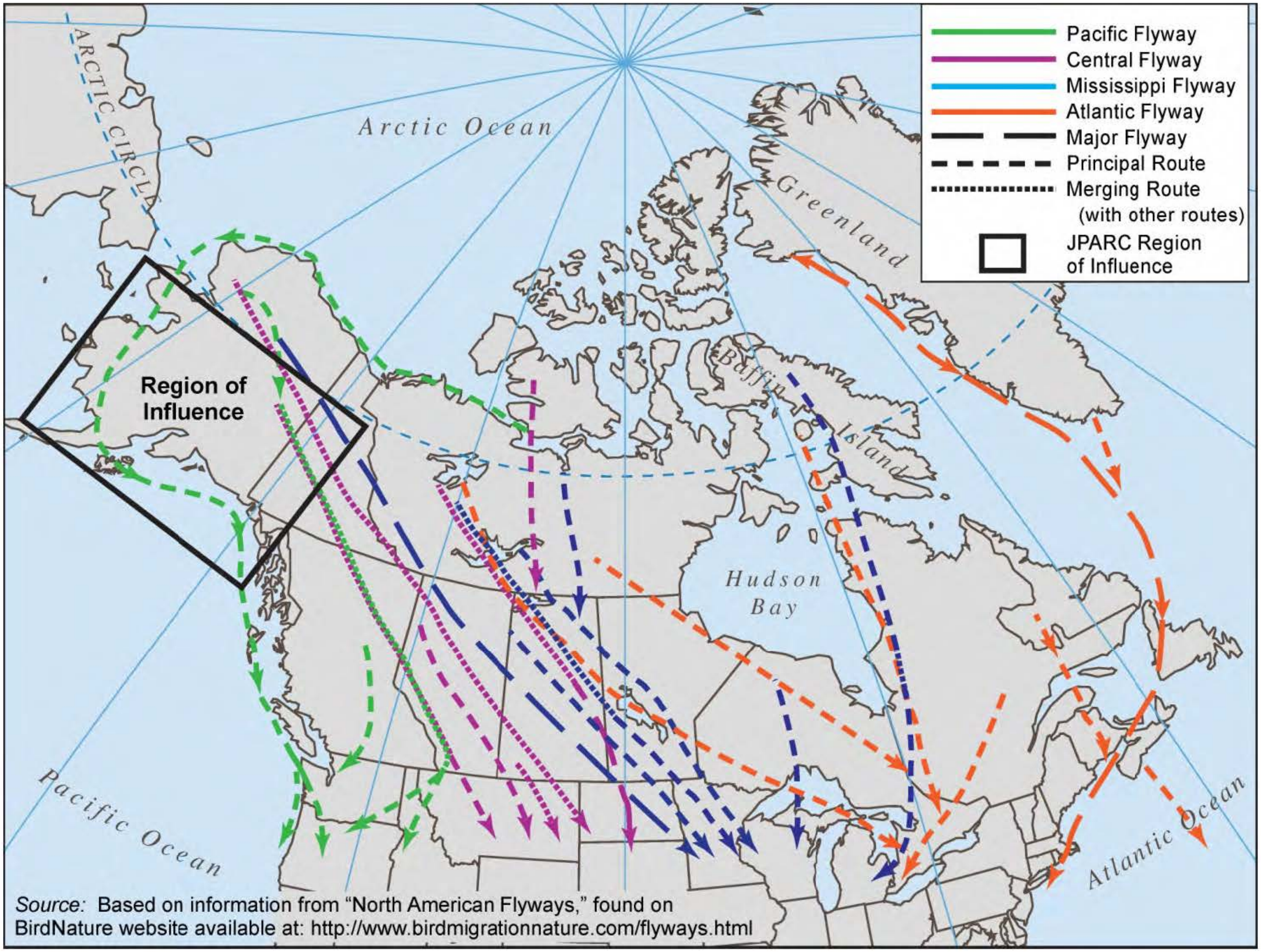


Figure B-13. Important Bison and Caribou Habitat in the ROI

Migratory Birds. Migratory bird flyways refer to established migration routes that avian species use year after year to travel between nesting and wintering areas across the United States and into adjacent countries. The continuing survival of many species is dependent upon the maintenance of access to these flyways to reach summer and winter habitats. Ensuring such access has been the object of international agreements/treaties such as the MBTA. Figure B-14 depicts the Pacific Flyway as it extends over the western Arctic, including Alaska and the Aleutian Islands and blends into the Rocky Mountain and Pacific Coast regions of Canada, the United States, and Mexico, south to where it becomes combined with other flyways in Central and South America (birdnature.com 2011). The coastal route that may be the best defined Arctic route in North America allows the passage of gulls, ducks, and other water birds across the Alaska Peninsula and the Gulf of Alaska paralleling the coastline of British Columbia, Washington, Oregon, and California. The vast delta region of the Yukon River in Alaska, a breeding ground for many species of waterfowl, marks the northern terminus for some of those birds that use the coastal route for most of their migratory flights. The longest and most important route of the Pacific Flyway is that originating in northeastern Alaska and passing for most of its length through the interior before heading south across Canada (birdnature.com 2011). Most of the waterfowl that travel along this route (e.g., ducks, geese, swans, sandhill cranes) nest in the Alaska interior. Known migration routes for waterfowl species present in the area potentially affected by the proposed actions as well as some known sensitive areas used for nesting are depicted in Figure B-15. Most military and other aviation agencies are aware of these flyways and already take precautions to avoid sensitive areas during the spring and fall migration periods.



Source: Based on information from "North American Flyways," found on BirdNature website available at: http://www.birdmigrationnature.com/flyways.html

Figure B-14. Major Migratory Bird Flyways Affecting the JPARC Region

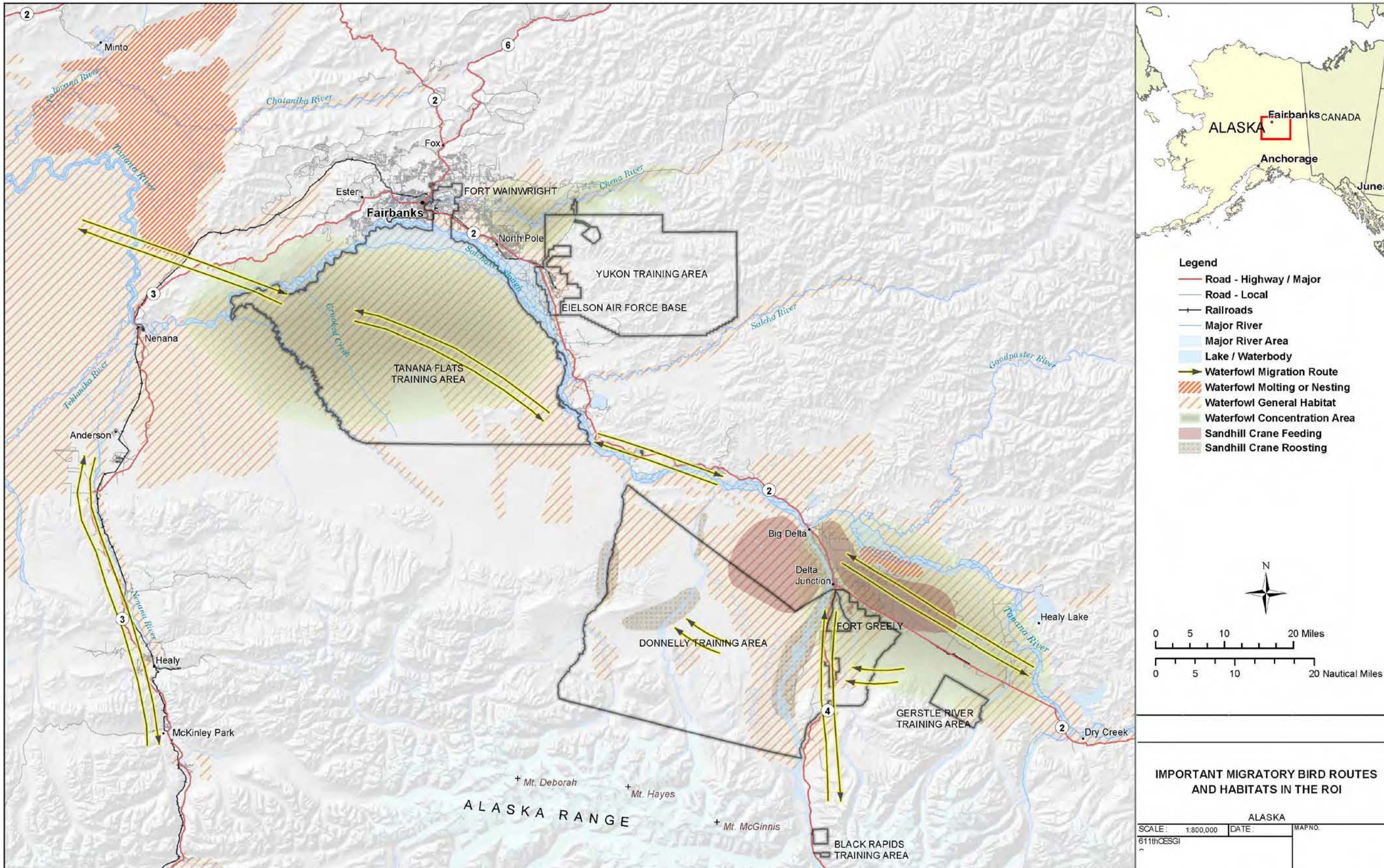


Figure B-15. Important Migratory Bird Routes and Habitats in the ROI

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B.8.3.2 Other Sensitive Habitats and Protected Species

Sensitive habitats are vulnerable to disturbance from various sources including humans, aircraft, watercraft and land vehicles, training activities, and construction activity. Sensitive wildlife habitats include those areas required to complete a portion of a species' life stage such as rutting, breeding, or special seasonal foraging (winter or spring), as well as parturition areas such as those used for lambing, calving, and nesting. Wildlife using these areas may be more alert and responsive to disturbances, and therefore may be vulnerable to adverse impacts on fitness or reproductive success. Larger, more general sensitive areas for wildlife include travel routes, migratory flyways, wetland areas, open water, and rivers. The known sensitive habitats and migration routes used by common terrestrial big game wildlife species that were available for project mapping are presented in Figure B-13 and Figure B-16. The presence of sensitive habitats or species may constrain expansion of military activities in specific areas. Sensitive areas near the area potentially affected by the proposed actions will be discussed in detail in Chapter 3.

Special Status Species. ESA- and state-listed sensitive wildlife species occurrence data were requested from the Alaska Natural Heritage Program (ANHP) and results were received March 31, 2010. No Federally listed, proposed, or candidate species are known to be present in the terrestrial areas potentially affected by the proposed actions. Nine birds (all migratory species) and one mammal with state sensitivity rankings were recorded as being present within the area potentially affected by the proposed actions. As for all heritage programs, the data reflect only those observations that have been mapped and reported to the ANHP. The specific observation points are less important to a large-scale project such as this than are the known aggregations of breeding, nesting, and other parturition habitats; seasonal ranges; and migration areas used by both common and sensitive species. Avoiding these sensitive habitat areas would reduce impacts on the largest numbers of species and would minimize safety risks. Known sensitive habitats on a project-level scale will be discussed in detail in Chapter 3.

B.8.3.3 Wetlands and Aquatic Areas

Wetland Areas. Wet areas that occur in the region include wetlands with seasonally persistent shallow open water areas interspersed with wet meadows that support emergent aquatic vegetation (e.g., sedges, grasses). More details are provided in Section B.6, Water and Wetlands. The extensive wetlands across Alaska's interior, in particular water bodies with stable water levels, are used in spring and fall by waterfowl and shorebirds for resting, feeding, breeding, and nesting. Migratory bird species expected to use wet areas in the area potentially affected by the proposed actions include a variety of waterfowl such as geese, ducks, loons, grebes, and scoters. In general, wet areas are avoided for new construction due to poor soil stability. Training may be able to take place on wet areas that are frozen from fall through winter, which would also reduce most adverse wildlife effects. Areas where waterfowl congregate during spring and fall pose seasonal safety hazards for low-altitude aircraft operations and are also generally avoided.

Permafrost

Permafrost is important to Arctic life and includes the soil layers that have remained at or colder than 0 degrees Celsius for at least two consecutive years. Precipitation is minimal in much of the area potentially affected by the proposed actions and tends to accumulate on the soil surface because it cannot penetrate into the frozen permafrost. During summer months a thin layer of soil closest to the surface can thaw, and the resulting water along with water from precipitation cannot percolate into the frozen layer beneath. This causes large portions of the Arctic landscape to be water-saturated throughout the summer months. This saturated soil provides habitat for plants, animals, and insects that rely on the abundant water source as well as the rich organic matter that occur there. Additionally, by slowing downward water movement and causing saturated conditions at the surface during the growing season, permafrost can influence the overlying vegetation, resulting in stunted forests of shallow-rooted species such as black spruce, which has some tolerance to saturated conditions in the root zone but also utilizes nutrients located near the surface.

Soil properties of permafrost are discussed in detail in Physical Resources Section B.5. Low-lying areas typically have permafrost near the surface and support stunted black spruce, whereas white spruce-birch forests are found on permafrost-free soils where roots can penetrate deeper. North-facing slopes are also most likely to contain permafrost, illustrating the importance of solar radiation in this region. Vegetation, as well as peat (decomposing vegetation), acts as a protective, insulating layer regulating ground temperature and depth of seasonal thawing for the underlying frozen soil and reducing the sun's rays that the soil receives. Removal or disturbance of vegetation, either by natural processes or by humans, causes thawing of the underlying permafrost. More extensive melting may cause sinkholes and other unstable conditions in permafrost areas.

Open Water and Rivers. The rivers present in the project area are known for supporting abundant species and numbers of fish, which are a valued biological, recreational, and subsistence resource in the region. Native fish found in the waterways potentially affected by the proposed actions include Chinook salmon, chum salmon, coho salmon, burbot, Arctic grayling, northern pike, chub, whitefish (several species), sheefish, rainbow trout, and Arctic char. Many native and exotic fish species, including rainbow trout, Arctic grayling, Arctic char, coho salmon, and Chinook salmon, are stocked by the state into waterways for recreational and subsistence angling purposes. More information on subsistence fishing is available in Section B.13. Fish-spawning locations are sensitive to changes in water quality caused by adjacent soil disturbance and subsequent sediment runoff into streams, which could limit the siting of nearby construction activities.

Maritime/Coastal Areas

Missile Live Fire with AIM-9X and AIM-120 is the only JPARC proposed action that would occur over the Gulf of Alaska (GOA) within the TMAA and warning area. The GOA is a highly productive region for a large variety of marine fish and shellfish populations and supports some of the most productive fisheries in the United States. In the GOA, most of the fishery resources are found along the broad continental shelf ecosystem (Navy 2011). Important marine fish species include salmonids (Chinook, coho, chum, pink, and sockeye salmon, and steelhead), Pacific halibut, shelf and slope groundfish (walleye pollock, Pacific, sablefish, rockfishes, rex sole, Dover sole, arrowtooth flounder), Dungeness crab, and scallops.

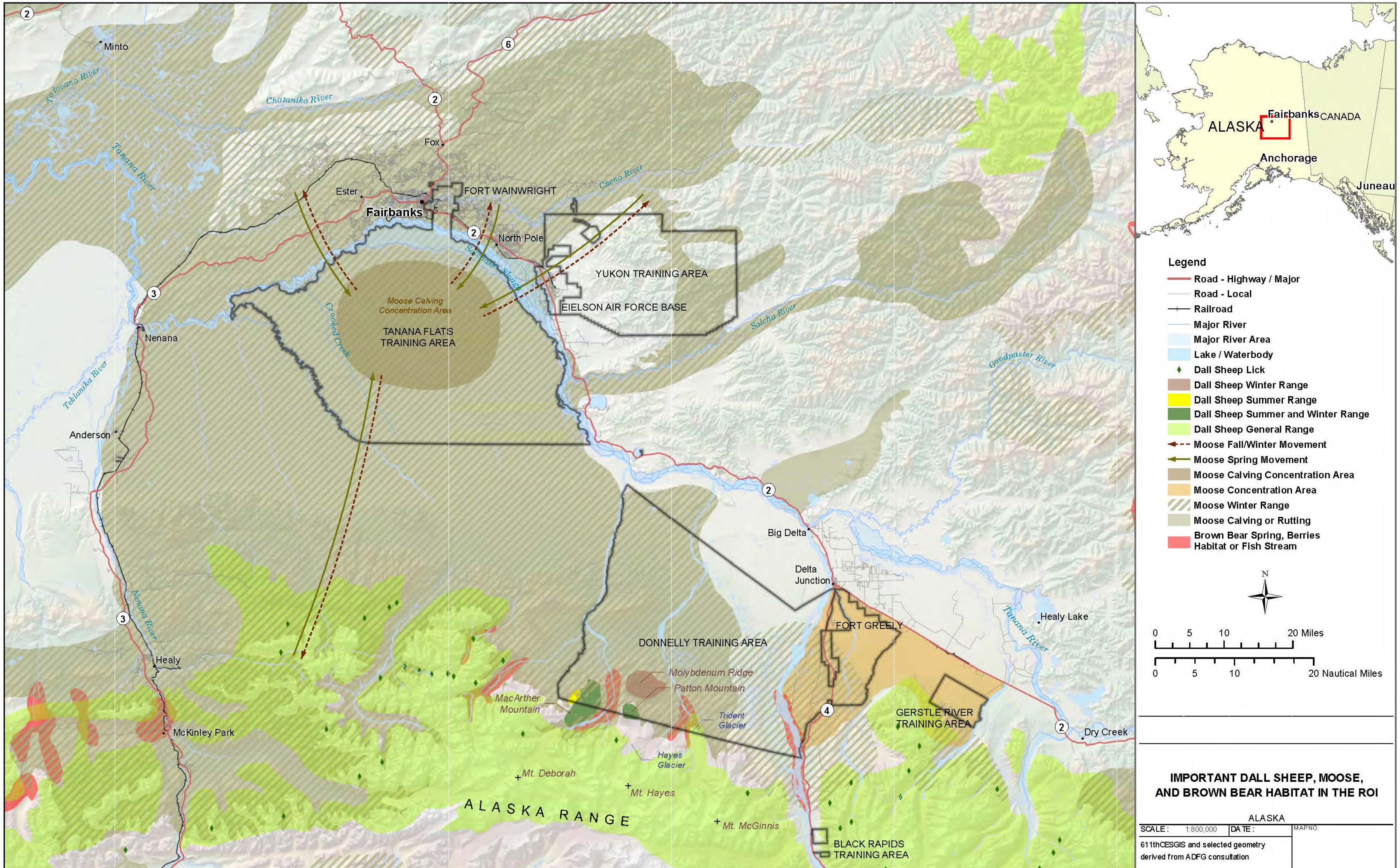

Figure B-16. Important Dall Sheep, Moose, and Brown Bear Habitat in the ROI

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The Pacific high-seas salmon are arguably the most important living marine resource within the GOA. Currently the GOA supports habitats for ESA-listed populations of high-seas Chinook, coho, chum, and sockeye salmon, and steelhead. Many species of marine mammals spend time in the GOA including cetaceans (whales and dolphins), pinnipeds (seals and sea lions), and sea otters. Occasional sightings of sea turtles also occur there. Some of the species present in the TMAA are listed as endangered or threatened under the ESA. These are identified in Section 3.11.8, Biological Resources for the Missile Live Fire AIM-9 and AIM-120 project.

B.8.3.4 Natural Resource Management

Military Installations. The regulations, purpose and importance of INRMPs were discussed in Section B.8.1 Regulatory Setting (under The Sikes Act). All available INRMPs for relevant JPARC military installations were obtained and referenced for this analysis. To guide and regulate the actions of Army personnel using and managing training lands, the Army has developed the Integrated Training Area Management (ITAM) program. The goals of ITAM are based on integration of the military mission, natural resource stewardship, and environmental compliance on Army training installations. The data provide installation-wide summaries of land use, disturbance, plant cover, vegetation communities, tactical concealment, birds, and small mammals. Other elements of ITAM include (1) Range and Training Land Assessment (RTLA), which addresses inventory and monitoring of natural resources in order to document resource conditions and assess the ability of the land to withstand impacts; (2) Land Rehabilitation and Maintenance (LRAM), which covers vegetation removal, revegetation, and preventive and corrective measures to restore the land and enhance the realism of training; (3) Sustainable Range Awareness (SRA), which educates officers, enlisted Soldiers, and community members to foster the wise use of our land; (4) Training Requirements Integration (TRI), which improves coordination and facilitates cooperation by providing information on land resource requirements; and (5) GIS, which provides standard mapping and spatial analysis capabilities that support the ITAM program components.

Aircraft Strike Hazard. Wildlife-aircraft strikes constitute a serious human safety concern; they can result in loss or damage to aircraft and death or injury to aircrew or local human populations. Because the actual threat of strikes affecting local wildlife populations is negligible compared to populations present and other sources of mortality, aircraft strikes are more of a human safety concern than a wildlife issue and more details are discussed under the Safety Section B.3. Aircraft may encounter terrestrial animals on runways and birds at altitudes up to 30,000 feet MSL or higher; however, most incidents tend to occur at lower altitudes. More than 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airport environment, and almost 55 percent, during low-altitude flight training (AFSC 2010). The potential for bird-aircraft strikes is greatest in areas used as seasonal migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, wetlands). The known and mapped migratory bird routes and general nesting, foraging, and resting areas in the project vicinity are discussed in Section B.8.3.1.2, Wildlife, and depicted in Figure B-15. The larger migratory waterfowl species (e.g., ducks, geese, swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at various elevations and times of day. Waterfowl vary considerably in size: from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. The two distinct migratory seasons, fall and spring are the times most likely for bird-aircraft strikes. These birds typically migrate at night, but also take advantage of optimal daytime migration weather and generally fly between 1,000 to 4,000 feet AGL (Griese 2007).

In addition to waterfowl, raptors, shorebirds, gulls, songbirds, and other birds also pose a hazard for aircraft strikes. Strike data for restricted areas show that incidents involving raptors result in the majority of serious (Class A or B) mishaps. Raptors of greatest concern in the ROI are eagles and hawks. In Alaska, migration periods for waterfowl and raptors are from August to October and from April to May.

In general, aircraft flights above 2,000 to 3,000 feet AGL would be higher than where most migrating and resident raptors occur. Songbirds are small birds, usually less than one pound, and pose less of a threat to aircraft. During nocturnal migration periods, songbirds navigate along major rivers, typically between 500 to 3,000 feet AGL.

Several installations have developed aggressive procedures (e.g., limited low-altitude operations, seasonal restrictions) designed to minimize bird-aircraft strikes. To the extent possible, airspace planning and target placement avoids large bird congregation areas and major flyways to ensure essential year-round access and training flexibility. Implementation of appropriate safety procedures is a standard method for managing bird strike risks.

State and Federal Game and Fish Management

Game Management Units (GMUs), which are designated geographic areas, specific hunting seasons, and appropriate licensing have been established by the ADFG to help manage big game populations. Refer to Section B.10.2.3, Recreation, and Section B.13, Subsistence Resources, for more details on hunting in the area potentially affected by the proposed actions. Chapter 3 also includes discussions of wildlife species that may be affected by project actions.

Fisheries

As discussed above under Fish and Aquatic Resources, fisheries are an important recreational, subsistence, and economic resource in interior Alaska. See Section B.10.2.3, Recreation, and Section B.13, Subsistence Resources, for more detailed information on Fishing/Angling Resources. The ADFG manages the resource by maintaining a database of Important Anadromous Fish Waters pursuant to Alaska Statute (AS) 16.05.871, providing maps divided into approximately 250-square-mile sections. ADFG issues fishing licenses to participate in commercial, sport, and personal use angling activities. ADFG also manages the resource by regulating activities in anadromous and resident fish-bearing streams through issuing fish habitat permits. Important species include finfish such as Arctic grayling, rainbow trout, northern pike, and Dolly Varden/Arctic char in addition to several salmon species.

Fire Management

Fire plays a natural and essential ecological role for maintaining the viability of boreal forest ecosystems. DoD personnel are well aware of fire's destructive potential in relation to human life, property, and valued resources, and are adept in the difficult decision-making process concerning fire suppression. Installation INRMPs describe the programs, policies, and procedures for integrated wildland fire management on USARAK lands and include an Integrated Wildland Fire Management Plan (USARAK 2006b). These plans reduce wildland fire potential, effectively protect and enhance valuable natural and cultural resources, integrate applicable state and local permit and reporting requirements, and implement ecosystem management goals and objectives on USARAK lands, all while directly supporting USARAK missions and remaining consistent with other plans. Wildland fire management in Alaska requires multi-agency cooperation. The Federal agencies have developed agreements that establish the Alaska Fire Service's responsibility for all fire detection and suppression on installation lands. Consistent with those agreements, the Army provides the Alaska Fire Service with the use of certain buildings, utilities, land, training services, air support, and other support services (USARAK 2006b).

In fire-prone areas, climate, human activity, and types of vegetation (or fuels) determine the level of wildland fire risk. Presuppression activities, including planning, prevention, fuels management, and prescribed burning, reduce wildland fire risk (USARAK 2006b). Prevention includes automated fire weather stations located across USARAK training areas and the FireWise Program, established nationwide to convey information to private homeowners on how to protect their property from wildland

fires. An example is "fuel modification," defined as removing and/or modifying an area of flammable vegetation, whether by constructing and maintaining a combination of fuel breaks and firebreaks or by prescribed burning. If a wildland fire escapes the initial attack, fuel breaks and other fuel modification areas provide the most logical locations for fire containment lines. Well-maintained fuel breaks and other fuel modifications provide defensible space that aids in wildland fire containment (USARAK 2006b).

B.8.3.5 Subsistence Resources

As described in Section B.13, Subsistence Resources, many local residents, particularly rural Alaskans and Alaska Native cultures, rely on native fish and game resources for part of their annual food and clothing supplies. Many Alaskan plant and wildlife species, including some considered sensitive, are legally hunted, trapped, and fished as subsistence resources. Included are salmon, freshwater fish, waterfowl, seals, moose, caribou, Dall sheep, black bear, porcupine, and many other species of small game. Subsistence also includes the collection of many native plants (e.g., berries, roots) that may be used as food, fiber, fuel, tools, or structural material.

B.9 CULTURAL RESOURCES

B.9.1 Definition of Resource

Cultural resources are prehistoric and historic sites, buildings, districts, or objects that are important to a culture or community for scientific, traditional, religious or other purposes. Cultural resources are generally divided into six categories: archaeological resources, architectural resources, traditional cultural properties, cultural landscapes, National Historic Landmarks, and National Monuments.

Archaeological resources occur in places where people altered the ground surface or left artifacts or other physical remains (e.g., arrowheads, glass bottles, pottery). Archaeological resources can be classified as either sites or isolates. Isolates generally cover a small area and often contain only one or two artifacts, while sites are usually larger in size, contain more artifacts, and sometimes contain features or structures. Archaeological resources can be either prehistoric or historic.

Architectural resources are standing buildings, dams, canals, bridges, windmills, oil wells, and other such structures. Generally, they must be more than 50 years old to be considered for inclusion in the National Register of Historic Places (National Register), although resources dating to defined periods of historical significance, such as the Cold War era (1946–1989) may also be considered eligible.

Traditional cultural properties are properties, sites, or other resources associated with the cultural practices or beliefs of a living community that link the community to its past and help maintain its cultural identity and are listed or eligible for listing on the National Register. Traditional cultural resources are areas that are associated with the cultural practices or beliefs of a living community that link the community to its past and help maintain its cultural identity that have not been evaluated for National Register eligibility. Sacred sites are well-known areas associated with cultural practices or beliefs of a living community. Most traditional cultural properties, resources, or sacred sites in Alaska are associated with Alaska Natives. Traditional cultural properties or resources may also be associated with other traditional lifeways, such as ranching. Traditional cultural properties or resources can include archaeological resources, locations of prehistoric or historic events, sacred areas, sources of raw materials used in the manufacture of tools and/or sacred objects, certain plants, or traditional hunting and gathering areas. Historic properties (as defined in the National Historic Preservation Act [16 U.S.C. 470 et seq.] and in 36 CFR 800) are significant archaeological, architectural, or traditional resources that are listed or eligible for listing on the National Register. Both historic properties and significant traditional resources identified by Alaska Natives are evaluated for potential adverse impacts of an action.

Cultural landscapes are geographic areas where cultural and natural resources and wildlife have been associated with historic events, activities, or people, or which serve as an example of cultural or aesthetic value. The four types of cultural landscapes are: historic sites (e.g., battlefields, properties of historic figures), historic designed landscapes (e.g., parks, estates, gardens), historic vernacular landscapes (e.g., industrial parks, agricultural landscapes, villages), and ethnographic landscapes (contemporary settlements, religious sites, massive geological structures).

National Historic Landmarks are cultural resources of national historic importance and are automatically listed on the National Register. Under the implementing regulations for Section 106 (36 CFR 800.10) of the National Historic Preservation Act of 1966, as amended (NHPA), special consideration to minimize harm to National Historic Landmarks is required, and both the Advisory Council for Historic Preservation and the Secretary of the Interior are consulted if any adverse effects are likely to occur to such resources.

National Monuments were established under the Antiquities Act of 1906, which gives the President of the United States EO authority to restrict the use of public land owned by the Federal Government as parks or conservation lands. National Monuments are "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest" (16 U.S.C. 431–433) that were identified for protection and Federal management. National Monuments that are historic in character and managed by the NPS are administratively listed on the National Register.

B.9.2 Regulatory Setting

The foundation for general legislation for preservation of cultural resources is the NHPA. Two sections of the Act, Sections 106 and 110, outline the processes Federal agencies must follow to manage and protect cultural resources or historic properties. Under the NHPA and its implementing regulations, only cultural resources that are listed or eligible for listing on the National Register (historic properties) are considered when assessing the possible effects of a Federal undertaking.

Section 106 requires Federal agencies to consider the effects of actions on historic properties through a consultation process. Evaluation studies are the mechanism by which inventories are performed and identified cultural resources are assessed against the criteria established in the National Register and upon which all subsequent management decisions are based. Processes outlined in Section 106 include resource identification/inventory, evaluation of significance, assessment of adverse effects on significant historic properties, and resolution of adverse effects. The goal of the Section 106 consultation is to identify historic properties potentially affected by the Federal undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties.

Archaeological and historic sites and structures are protected under a number of laws, including the Antiquities Act of 1906 (16 U.S.C. 431–433), the Historic Sites Act of 1935 (16 U.S.C. 461–467), the American Indian Religious Freedom Act of 1978 (AIRFA) (42 U.S.C. 1996), the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa–470mm), the NHPA (16 U.S.C. 470 et seq.), and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 U.S.C. 3001 et seq.).

Certain Native American sites of traditional cultural and religious importance may not meet National Register criteria as historic properties, but are still considered to be cultural resources. The DoD's American Indian and Alaska Native Policy and DoD Instruction 4710.02, *Interaction with Federally Recognized Tribes* (2006) emphasize the importance of respecting and consulting with tribal governments on a government-to-government basis to assess the effects of proposed DoD actions that may have the potential to significantly affect protected tribal rights, Indian land, or resources before decisions are made by the Services (DoD 1998). Properties identified by tribes as properties of traditional cultural and

religious importance, but do not qualify for listing on the National Register, are still managed according to the DoD American Indian and Alaska Native Policy.

Several regulations address the requirement of Federal agencies to notify or consult with Native American tribes or otherwise consider their interests when planning and implementing Federal undertakings. In particular, on April 29, 1994, the President issued the *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, which specifies a commitment to developing more effective day-to-day working relationships with sovereign tribal governments. In addition to the Memorandum, EO 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000), reaffirms the U.S. Government's responsibility for continued collaboration and consultation with tribal governments in the development of Federal policies that have tribal implications, to strengthen the government-to-government relationships with Native American tribes, and reduce the imposition of unfunded mandates upon Native American tribes. This EO supersedes EO 13084, signed May 14, 1998.

EO 13007, *Indian Sacred Sites*, issued on May 24, 1996, requires that in managing Federal lands, agencies must accommodate access to and ceremonial use of sacred sites, which may or may not be protected by other laws or regulations, and must avoid adversely affecting the physical integrity of these sites.

EO 13287, *Preserve America*, signed March 3, 2003, directs Federal agencies to increase their knowledge of historic resources in their care and to enhance the management of these assets, and promotes intergovernmental cooperation and partnerships for the preservation and use of historic properties.

DoD Instruction 4715.16**,** *Cultural Resources Management* (DoD 2008), establishes DoD policy and assigns responsibilities to comply with applicable Federal statutory and regulatory requirements, EOs, and presidential memorandums for the integrated management of cultural resources on DoD-managed lands.

DoD Instruction 4710.02, *DoD Interactions with Federally-Recognized Tribes*, September 16, 2006 (DoD 2006), implements the DoD Native American and Alaska Native Policy, assigns responsibilities, and provides procedures for DoD interaction with Federally recognized tribes. The NHPA requires agencies to consult with Native American tribes if a proposed Federal action may affect historic properties to which they attach religious and cultural significance. The AIRFA sets the policy of the United States to "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian…including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites."

AFI 32-7065, *Cultural Resources Management Program* (Air Force 2004c), supplements Air Force policy for managing cultural resources to support the military mission and to meet legal compliance requirements and establishes guidelines for managing and protecting cultural resources on property affected by Air Force operations in the United States. AFI 32-7065 implements Air Force Planning Document 32-70, *Environmental Quality* (Air Force 1994a), and DoD Instruction 4715.3, *Environmental Conservation Program* (DoD 1996).

AR 200-1, *Environmental Protection and Enhancement* (Army 2007b), is the Army's policy for managing cultural resources to meet legal compliance requirements and to support the military mission. It prescribes Army policies, procedures, and responsibilities for meeting cultural resources compliance and management requirements.

AR 200-1, *Environmental Protection and Enhancement* (Army 2007b), provides implementing guidance for Army policy requirements contained in AR 200-1. It outlines a cultural resources management strategy, provides integrated cultural resources management plan preparation guidelines, provides implementing guidance for regulatory/statutory compliance activities, and contains guidelines for consulting with Native Americans.

The Alaska Office of History and Archaeology implements the Alaska Historic Preservation Act (Alaska Statute 41.35.70) and works to preserve sites and buildings that reflect the heritage of Alaska. The Alaska Office of History and Archaeology are consulting parties in any section 106 consultation.

B.9.3 General Description of Affected Environment

Cultural resources in the JPARC planning area include prehistoric archaeological sites; historic archaeological sites; historic buildings and structures; and properties of traditional, religious, and cultural significance. Prehistoric sites are often found in locations that are higher in elevation than the surrounding landscape, such as bluffs and terraces, and usually in proximity to water, including rivers, drainages, and lake margins. Historic sites in the region are often associated with historic roads/trails, rivers, drainages, and lake margins. Cold War–era historic properties are found on many military installations in this region. Properties of traditional, religious, and cultural significance are found throughout the region and are identified through consultation with tribes that have knowledge of the geographical area of interest.

B.9.3.1 Prehistoric and Historic Eras

Discussion of the cultural history of Alaska is commonly divided into two general periods: prehistory and history. Table B–16 outlines the dates and characteristics of the Prehistoric and Historic Periods of Alaska, and a brief historic overview is in Appendix H.

Prehistory refers to the period for which there exists no documentary (e.g., written) evidence of the events or people living during that time. Alaskan prehistory varies regionally due to natural conditions that either enhanced or limited human occupation in a given area of the state. The extent of glacial coverage and the rate and direction of glacial retreat greatly influenced the capacity of a region to support prolonged human occupancy and activity. Evidence suggests that interior portions of Alaska were inhabited at least 13,000 years ago, and coastal regions were inhabited later.

Alaska's earliest inhabitants were nomadic hunters who traveled in small bands and persisted through the arrival of European traders in the late 1810s, and their habitation in the region continues to the present day. The nomadic nature of the state's earliest inhabitants, coupled with the organic nature of the materials they manufactured and used and changing environmental conditions, has presented difficulties in finding evidence of their activities. Archaeological evidence is usually limited to lithic artifacts, such as projectile points, cutting tools, scrapers, waste flakes, and hearths.

Historic refers to the period following the introduction of written records. The transition from the prehistoric to the historic period in Alaska varies from region to region; for interior Alaska the period begins with the migration of Russian fur traders around the 1830s. The early historic period is marked by the continuation of traditional activities with the addition of a limited European presence in the region. Gold rushes began in the late 1880s and substantially altered the regional demographics and economy.

Table B–16. Summary of History and Prehistory Periods of Interior and South-Central Alaska

Era	Dates	Description
Interior Alaska Prehistory		
Paleoarctic Tradition	12,000–8,000 BP	Early inhabitants camped on terraces and bluffs above treeless steppes, hunted large mammals such as bison and mammoth; tools fashioned from stone, bone, antler, and ivory; artifacts include microblades and microblade cores.
Northern Archaic Tradition	6,500–1,000 BP	Adaptations due to boreal forest expansion, such as side-notched projectile points; tools include bifacial knives, microblades, end scrapers, and side-notched points.
Athabascan Tradition	2,500–1,500 BP	Varied settlement patterns, often nomadic culture, subsisting primarily on terrestrial animals; subgroups exhibit distinct cultural characteristics.
Interior Alaska History		
Early Contact	1810–1880s	Contact between aboriginal groups and Russians or English, probably at trading posts.
Gold Rush	1880s–1928	Period of influx of Euroamerican settlement in interior Alaska in response to multiple gold discoveries.
Development of Infrastructure	1890s–1910s	Establishment of roads and railway connecting interior Alaska with other areas.
Military Activities	1890s–Present	Increased military presence in interior, beginning with the establishment of Ladd Field.
South-Central Alaska Prehistory		
Early Holocene	8,000–6,000 BP	Oldest known sites; earliest inhabitants probably entered from interior and practiced terrestrial hunting and gathering; tools found are similar to those from the Denali Complex of interior Alaska.
Middle Holocene	6,000–3,000 BP	Probable shift in subsistence from terrestrial to marine resources; poorly represented archaeological record.
Late Holocene	3,000–1,000 BP	Pacific Eskimo cultural affiliation; Norton and Kachemak traditions represented; tools include pottery, transverse knife (ulu); multiple sites found throughout Cook Inlet.
Late Prehistoric	1,000–250 BP	Athabascan material culture; house depressions, cobble spall scrapers, fire-cracked stone; probable association with Denaina Athabascans.
South-Central Alaska History		
American Era	1867–1938	Alaska Purchase and gold rushes increase Euroamerican presence; growth of Cook Inlet as port, and later, rail terminus.
Military Era	1939–present	Fort Richardson established; World War II and Cold War lead to military increases.

Key: BP=Before the Present.
Source: USARAK 2004.

World War II and the Cold War drew thousands of people to Alaska for military service and deployment. Military installations that would eventually become Eielson AFB, Elmendorf AFB, Fort Richardson, and Fort Wainwright were constructed during and in the years directly following World War II. Since the statehood of Alaska in 1959, the Trans-Alaska Pipeline, native land claim settlements, and public lands legislation have each had profound influences on the region.

B.9.3.2 Alaska Native Villages

Alaska Natives live within the ROI of many of the proposals addressed in this EIS (refer to Figure 3–11 in the EIS, Section 3.1.9, Cultural Resources). Federally recognized Alaska Native tribes within the ROI include Native Village of Crooked Creek, settled by Eskimo and Ingalik people; Native Village of Georgetown, a seasonal fishing village; Lime Village, a Dena`ina Athabascan Indian settlement; Village of Red Devil, a village populated by a mix of Eskimo, Athabascan, and non-native inhabitants; Village of Sleetmute, founded by Ingalik Indians; Village of Stony River, a mix of Indian and Eskimo people; and New Koliganek Village Council. Other Federally recognized Alaska Native tribes in the area include the Native Village of Eagle, Circle Native Community, Chalkyitsik Village, Village of Dot Lake, and Healy Lake Village. Native lifestyle in many of these villages is based on subsistence activities. Alaska Native regional corporations in the region are Cook Inlet Region, Inc., Calista Corporation, Doyon, Ltd., Ahtna Inc., and Bristol Bay Native Corporation.

B.10 LAND USE

B.10.1 Definition of Resource

Land Use. Land use refers to general land use patterns, land ownership, land management plans, and special use areas within the EIS study area. General land use patterns within a particular area include forest, residential, military, mining and resource production, and recreational uses, with multiple uses often occurring in any given area. Land ownership is a categorization of land according to type of owner. Major landowners include the Federal Government, the state, Alaska Native corporations, and private individuals. Federal lands are described in terms of the managing agency, which may include the USFWS, the USFS, the BLM, or DoD. State of Alaska land in areas potentially affected by the proposed action is typically managed by the Departments of Fish and Game or Natural Resources. Relevant land management plans include those documents prepared by agencies to establish appropriate activities, controls, priorities, and goals for current and future use and development. As part of this process, some areas are selected by agencies as being worthy of more-rigorous management and restrictions on use.

Implicit in land uses are the resources and qualities that make such uses suitable for a particular locale. Man-made improvements, natural qualities, or both may be essential for some land uses. As an example, the suitability of land for recreational hunting depends on that land’s capability to support wildlife and other factors such as accessibility, natural setting, and quietness.

Public Access. Surface access to remote areas beyond the major highways linking population centers relies on a public network of smaller roads and trails. Where these pass through land under multiple ownership, agreements provide for such access, be it simply for recreation or for more-critical purposes such as emergency service, access to isolated homes and communities, resource management, or subsistence harvesting. Public access is governed by Federal or state land management policies instituted for the highest public benefit. This may include restricting access to some areas, restricting permissible modes of access, or defining which routes are open or closed.

Recreation. Recreation is defined as leisure pursuits that occur outdoors. It includes, but is not limited to, activities such as sport hunting, sport fishing, trapping, trail use, off-road recreational vehicle (ORRV) use, camping, water sports, river floating, powerboating, mountain climbing, photography, sightseeing, hiking, cross-country skiing, snowshoeing, dog sledding, snowmachining, mountain and road cycling, wildlife watching, and berry picking. Recreation resources include land areas designated for recreational activity, including parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, hunting, fishing, and wildlife. In addition to these natural resources, man-made facilities are designated or made available for public recreational use. Recreation is frequently one of

many uses supported by public lands, either as a primary purpose or secondary to other uses (e.g., conservation and preservation, forestry, energy development).

B.10.2 Regulatory Setting

B.10.2.1 Land Use

The Federal Land Policy and Management Act (FLPMA). This act was enacted in 1976 for the purpose of establishing a unified, comprehensive, and systematic approach to managing and preserving public lands in a way that protects "the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." Uses of public lands that the BLM manages include commercial uses such as livestock grazing, mineral extraction, and logging; recreational uses such as fishing, hunting, birding, boating, hiking, biking, and off-roading; and conservation of biological, archeological, historical, and cultural resources. The FLPMA requires the BLM to implement principles for multiple uses of public lands and sustained yields of resources.

Wilderness Act (16 U.S.C. 1131–1136 et seq.). This act establishes the National Wilderness Preservation System. Wilderness Areas are designated by Congress and are composed of existing Federal lands that have retained a wilderness character and meet the criteria found in the act. Federal officials are required to manage Wilderness Areas in a manner conducive to retention of their wilderness character and must consider the effects on wilderness attributes of management activities on adjacent lands.

Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.). This act establishes a system of areas distinct from the traditional park concept to ensure the protection of each unique river. It also designates rivers that possess remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values as Wild and Scenic Rivers. These rivers are protected for the benefit and enjoyment of present and future generations.

National Forest Management Act of 1976 (NFMA). This act requires every national forest or grassland managed by the USFS to develop and maintain a Land Management Plan (also known as a Forest Plan) and to develop regular reports on the status and trends of the nation’s renewable resources on all forest and rangelands. It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes.

Alaska National Interest Lands Conservation Act (ANILCA) (15 U.S.C. 3101–3223). This Act provides for the designation and conservation of certain public lands in the State of Alaska, including units of the National Park, National Wildlife Refuge, National Forest, National Wild and Scenic Rivers, and National Wilderness Preservation Systems, and for other purposes.

11 AAC 96.014, Special Land Use. This code lists sites and areas of state land designated as special use land. These sites and areas of land have special scenic, historic, archaeological, scientific, biological, recreational, or other special resource values warranting additional protections or other special requirements. AS 16.20, *Conservation and Protection of Alaska Fish and Game*, designates certain lands to protect and preserve natural habitat areas and game populations or to enhance habitat for particular wildlife species. These legislatively designated areas include State Wildlife Areas (sanctuaries, Critical Habitat Areas, Refuges, State Range Areas, State/National Refuges). The ADFG manages most of these areas.

The Sikes Act (16 U.S.C. 670 et seq.; PL 86-797). This act promotes effectual planning, development, maintenance, and coordination of wildlife, fish, and game conservation and rehabilitation on military reservations. It includes a cooperative plan for conservation and rehabilitation and provides for the

sustainable multipurpose use of natural resources (hunting, fishing, trapping, and nonconsumptive uses) and public access to facilitate the use, subject to safety requirements and military security. The Sikes Act authorizes a program for the conservation, restoration, and management of migratory game birds on military installations, including the issuance of special hunting permits. Finally, it authorizes a program for the management of fish- and wildlife-oriented recreation resources at military installations and a program for public recreation.

Forests Act (AS 41.15). This act provides protection for the natural resources and watersheds on land that is owned privately, by the State of Alaska, or by a municipality. The Department of Natural Resources, Division of Forestry, manages land regulated under this act.

DoD Directive 4700.4, Natural Resources Management Program (DoD 1989). This directive prescribes policies and procedures for the integrated program for multiple-use management of natural resources on property under DoD control.

AR 200-1, Environmental Protection and Enhancement (Army 2007b). This regulation covers environmental protection and enhancement and provides the framework for the Army Environmental Management System. This regulation provides for controlled recreational access where feasible at Army installations containing land and water areas suitable for recreational use.

AR 350-19, The Army Sustainable Range Program (Army 2005). This regulation assigns responsibilities and provides policy and guidance for managing and operating Army ranges and training lands. The regulation describes use of ranges and training lands by civilians and discusses the recreational use of training land and ranges.

AR 385-63, Range Safety (Army 2003). This regulation provides range safety police for the Army and U.S. Marine Corps and establishes surface danger zones as minimum safety standards; requires establishment of range safety programs for all ranges; prohibits specific operations without specific approval; establishes risk management principles and deviation authorities; and employs the risk management process to identify and control range hazard. This regulation outlines risk management principles related to outdoor recreational activities on ranges or training areas.

B.10.2.2 Public Access

Revised Statute (RS) 2477, Refuge Rights-of-Way and Easements. This statute, which emerged from Section 8 of the Mining Act of 1866, promotes public highway construction through the largely unsettled western territories. This section granted the right-of-way for construction of highways over public lands not reserved for public uses. RS 2477 was repealed on October 21, 1976 by the FLPMA (43 U.S.C. 932). Because the FLPMA did not terminate valid existing right-of-ways, the Federal Government retains ownership of thousands of RS 2477 right-of-ways across Alaska, which, as the Congress intended, provide an important role in settling those areas. In Alaska, these right-of-ways continue to play an essential role in accessing Alaska's lands. To date, the ADNR has researched over 2,000 routes and determined that approximately 647 qualify under RS 2477.

AS 38.05.126, Navigable and Public Water. This statute provides the people of the State of Alaska with a constitutional right to free access to, and use of, the navigable or public water of the state. It also provides that ownership of land bordering navigable or public waters does not grant an exclusive right to use of the water, and that a right of the title to the land below the ordinary high water mark is subject to the rights of the people of the state to use and have access to the water for recreational purposes or other public purposes for which the water is used or capable of being used consistent with the public trust.

B.10.2.3 Recreation

National Trails System Act, as amended (16 U.S.C. 1241 et seq.). This act establishes a national system of recreational, scenic, and historic trails and prescribes the methods and standards for adding components to the system.

Outdoor Recreation Act (16 U.S.C. 4601 et seq.). This act lays out DOI's role as coordinator of all Federal agencies for programs affecting the conservation and development of recreation resources. The Secretary of the Interior is directed to prepare a nationwide recreation plan and provide technical assistance to states, local governments, and private interests to promote conservation and utilization of recreation resources.

Federal Water Project Recreation Act (16 U.S.C. 460 l-12–460 l-21; PL 89-72; 79 Stat 213 as amended by PL 93-251; 88 Stat 33 and PL 94-576; 90 Stat 2728). This act provides that recreation and fish and wildlife enhancement be given full consideration as purposes of Federal water development projects under certain circumstances. This act also authorizes the Secretary of the USFWS to provide facilities for outdoor recreation and fish and wildlife at reservoirs under USFWS control, except those within national wildlife refuges.

Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661–667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401). This act, among other provisions, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with Federal and state agencies to protect, rear, stock and increase the supply of game and fur-bearing animals.

EO 11644, Use of Off-Road Vehicles on Public Lands. This order establishes policies and provides for a procedure that ensures that the use of off-road vehicles on public lands is controlled and directed so as to protect the resources of public lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.

AS 41.21, Parks and Recreational Facilities. This statute designates state parks that foster the growth and development of a system of parks and recreational facilities and opportunities in the state for the general health, welfare, education, and enjoyment of its citizens and for the attraction of visitors to the state. These areas are managed by the ADNR, Division of Parks and Outdoor Recreation.

B.10.3 General Description of Affected Environment

B.10.3.1 Land Ownership, Management, and Use

Land Ownership. Land ownership is the primary influencing factor on what activities may take place on land and by whom. The foundation for current land ownership in Alaska was set when the Territory of Alaska became a state in 1959. The Federal Government granted the new state 28 percent ownership of its total area (about 104 million acres) (ADNR 2000a). There are currently three primary landowner types in Alaska. These include the Federal Government, State of Alaska entities, and private/municipal and Alaskan Native owners. The general distribution of these ownership categories is shown in Figure B-17.

Federal Land. The Federal Government is the largest landowner in Alaska, with control of some 60 percent of the total land area (222 million acres). This acreage includes national parks, wildlife refuges, national forests, and military reservations. More than a dozen Federal agencies manage Federal lands in Alaska. The larger Federal landowners are DoD and DOI (including the BLM, NPS, and USFWS).

State Land. The State of Alaska currently owns 101 million acres. The state's land and resources are available to support the state's economy for road construction, economic development, and construction of houses, schools, and other public and private facilities. In addition, the state can select undesignated Federal land for settlement, resource usage, and recreational needs for its citizens (ADNR 2000a). Resource uses include agriculture, forestry, commercial fisheries, mining, oil and gas development, and wildlife habitat. Recreational land provides for wildlife, back-country recreation, and varying degrees and types of developed recreation to provide a variety of experiences for Alaskans and the tourist industry (ADNR 2000a). The state has received patents to approximately 85 percent (90 million acres) of its total land selections.

Once selected, ADNR land planners develop area plans (APs). Planners consider laws and policies and the character of the land itself, recommendations made by resource experts, and public input to determine the most appropriate management of currently owned (patented) or selected state land. Plans are developed for land in selected status in anticipation of its conveyance to the state (ADNR 2000a). The ADNR has the task of managing the state-owned lands for the "maximum public benefit." The range of possibilities for how state land could be used is vast. Specifically, the Division of Mining, Land and Water has primary responsibility for land use planning. Several APs overlap with portions of the EIS study area.

Municipal Land. A small quantity of state land was transferred to local jurisdictions and boroughs. These lands generally have been used for public amenities and infrastructure, but some land is available for private individuals under a variety of mechanisms that encourage homesteading and settlement in remote areas.

Native Lands. Alaska Native corporations were established in 1971 (43 U.S.C. 1606) when the U.S. Congress passed the Alaska Native Claims Settlement Act (ANCSA), which determined land and financial claims made by the Alaska Natives and established 13 regional corporations to administer those claims. This law granted 44 million acres to village and regional corporations created under the act. These lands are classified as private land. Of this land, about 26 million acres was divided between 224 village corporations attached to villages with 25 or more residents. These village corporations own the surface rights to the lands they selected, but the larger regional corporations own the subsurface rights of both their own selections and of those of the village corporations. The remaining acres 18 million acres, which include historic sites and existing native-owned lands, went into a land pool to provide land to villages of less than 25 people.

Within the regional Native corporations, village corporations own the land in and around their communities. The primary Native corporation within the study area is Doyon, Limited, but other regional corporations with land in the region include Cook Inlet Region, Inc., Calista Corporation, Ahtna Inc., and Bristol Bay Native Corporation.

Private Land. Both the Federal government and the state may transfer tracts of land to local governments or lease and dispose of land to the private sector. Land in private ownership (other than Alaskan Native land) accounts for less than 1 percent (about 2.7 million acres) of the total land in Alaska. Much of the best land for development around Alaska's communities is, or will be, privately owned. This land also provides a tax base for cities and communities to help support public services (ADNR 2000a). Some local municipalities and boroughs have developed plans and land use controls for managing borough-owned and private lands under their jurisdictions.

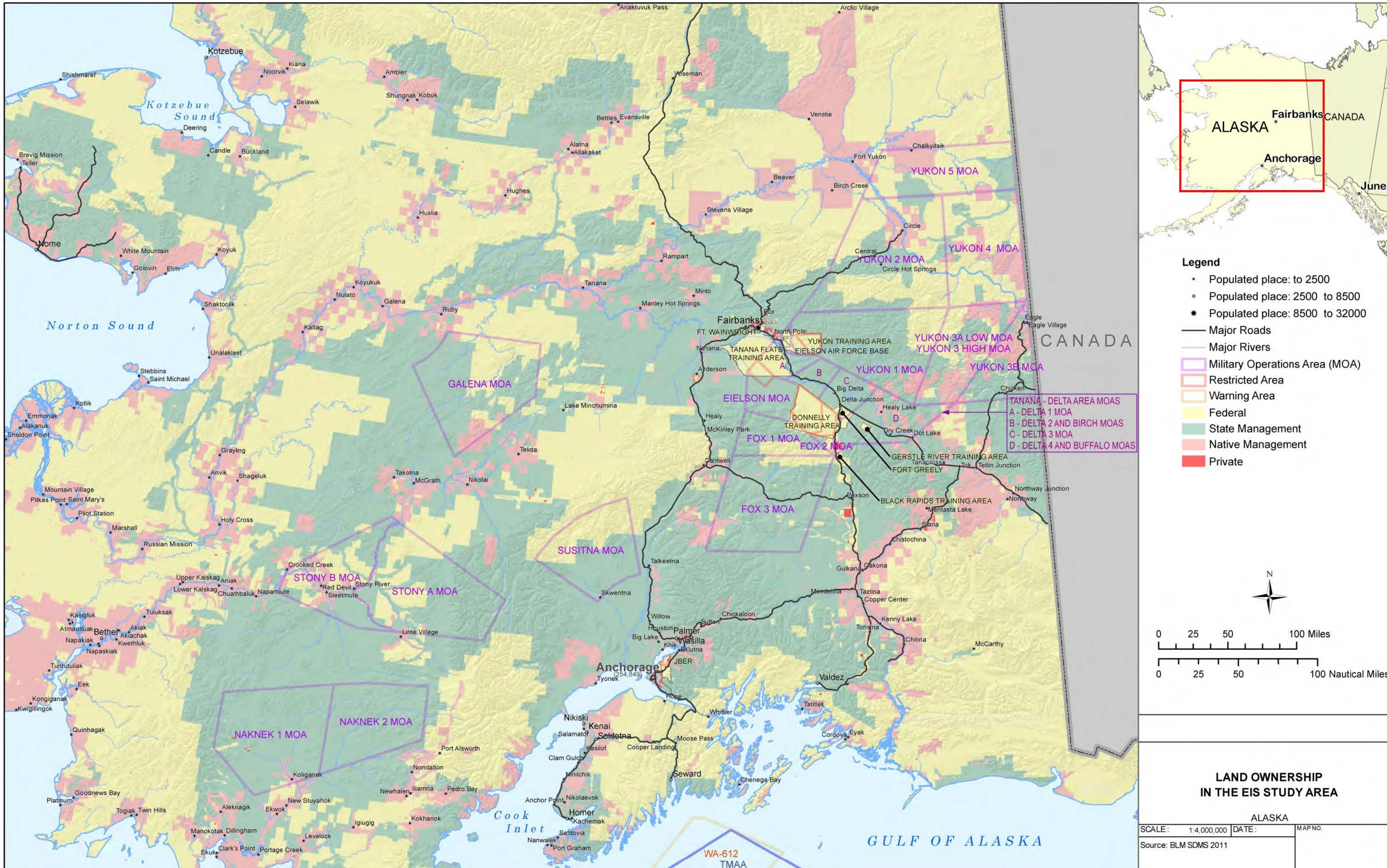

Figure B-17. Generalized Regional Land Ownership in Central Alaska

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Land Management and Use. This section describes general land uses occurring within the area affected by the EIS proposals. The following five broad categories are used for this presentation: military land (DoD withdrawn land), special use areas (Federal and state), general unspecified land (Federal and state), resource-classified and productive-use lands (Federal and state), and private land (including Native village lands).

Military Land. Approximately 1.5 million acres of land within the study area is BLM land withdrawn for military use. Withdrawn lands under DoD management serve the primary purpose of supporting military use. The original state or Federal owner is responsible for the long-term condition and use of withdrawn lands and therefore maintains an oversight interest in their ongoing management. Due to ongoing activities such as testing and training, the potential for UXO or other hazardous materials and activities exists on DoD property. As a result, much of this land is not accessible by the general public. Infrastructure and development to support military uses includes airfields, test and training ranges, billeting areas, administrative and community support facilities, operations and maintenance areas, ports, and logistics and supply areas.

The primary DoD sites and locations within the EIS study area include Fort Wainwright, Fort Greely, DTA, TFTA, YTA, GRTA, BRTA, and Eielson AFB. Activities at these locations are described in the JPARC Master Plan and under specific proposals in Chapter 3 of the EIS.

Special Use Areas (Federal and State). Special Use Areas are legislatively designated for a variety of purposes, generally with an emphasis on conserving natural qualities and providing recreational opportunities. Figure B-18 and Figure B-19 show the extent of special use areas on Federal and state lands, respectively, within the EIS study area. These areas include Federal and state parks, wilderness areas and Wild and Scenic Rivers (WSRs), and special management and conservation areas. Within these areas may be developed recreational sites, trails, and camping areas. Both Federal managers and the ADNR generally manage fish and wildlife resources for maximum sustained yields. Permits for fishing and harvesting are allocated based on relative abundance of species and Federal and state subsistence priorities (see Section B.13, Subsistence, for additional information). State legislatively designated areas include wildlife areas, special range and critical habitat areas, refuges, parks, recreation areas, forests and resource management areas, and multiple-use areas.

The BLM mission in Alaska is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. The USFS administers the nation's national forests and grasslands. Region 10 of the USFS based in Juneau, Alaska, oversees the two national forests in Alaska, Chugach National Forest and Tongass National Forest, which together encompass a total of 2,737,735 acres. The special use areas within areas of potential impact of each of the EIS proposals are identified in Chapter 3 of the EIS. The NPS promotes and regulates the use of national parks, monuments, and reservations under its control. Within the study area, 23,188,855 acres are administered by the NPS. Land use within these parcels is in accordance with the NPS's stated objectives of managing land (NPS 2011).

National and state WSRs are designated to preserve outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, and other qualities. WSRs are preserved in their free-flowing condition with emphasis on maintaining their wild and/or scenic values. Similarly, wilderness areas are managed rigorously to preserve exceptional remote and pristine lands as a national asset for future generations. The National Wildlife Refuge System administers lands and waters in Alaska for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats. There are four refuges within the JPARC region totaling 24,137,366 acres: the Innoko National Wildlife Refuge, the Kanuti National Wildlife Refuge, the Nowitna National Wildlife Refuge, and the

Yukon Flats National Wildlife Refuge. These Federal lands are typically subject only to anthropogenic disturbances from recreation, education, and research activities.

State Land Classifications. In various area plans, ADNR classifies state land according to its highest value and management priority. These classifications include habitat, recreation, disposal, special use, and general use. Most land supports multiple uses that are secondary to the classified use. Special use lands are those with special scenic, historic, archaeological, scientific, biological, recreational, or other special value warranting special requirements.

General Unspecified Land (Federal and State). This land use includes undeveloped land areas that do not fall into other classifications but are managed for multiple uses according to Federal and state agency land management plans. Activities and users of such Federal and state land must follow regulations that meet basic requirements under Federal, state, and local laws as to use and conservation of land and water resources (such as minimizing disturbance) for sustainable yields. Activities that are generally allowed on state-owned public domain land without permit or other written authorization (per 11 AAC 96.020) include non-commercial hiking, camping, backpacking, skiing, climbing, bicycling, travel by horse or dogsled with pack animal, use of highway vehicles, use of recreational-type off-road or all-terrain vehicles, landing of aircraft, use of watercraft, hunting, fishing, trapping, berry picking, and recreational gold panning. Also allowed are noncommercial (i.e., personal use) trapping; harvesting of wild plants, mushrooms, and other plant material; use of dead and down wood for a cooking or warming fire; and hard-rock mineral prospecting or mining on a small scale (ADNR 2009).

Productive-Use. Productive use of land (in this EIS) generally refers to commercial operations that extract, harvest, produce, or use a natural resource. Both Federal and state managers regulate the terms and conditions for these uses on public land. Uses on private and Native lands must comply with any applicable laws and regulations. The primary productive uses found in the EIS study are described below. The locations of non-renewable resources (and high-potential areas) and major sites are shown in Figure B-20. Figure B-21 shows the location of renewable resources in the study area.

Leasable minerals include oil, gas, coal, geothermal resources, oil, shale, gilsonite, phosphate, potassium, and sodium (USARAK 2006b). Potential for mining leasable mineral resources is ideal within the vicinity, west of Fairbanks, and south-southwest of Anchorage. Coal mining potential is high west of George Parks Highway, northwest of Anchorage, west of Kenai Fjords National Park, and in the Lake Louise area. There is also the potential for mining coal on Joint Base Elmendorf-Richardson (USARAK 2006b).

For oil and gas extraction in Alaska, an extensive pipeline system has been established. The Trans-Alaska Pipeline System and the proposed Trans-Alaska Gas System run from Prudhoe Bay to Valdez, Alaska. The Trans-Alaska Pipeline System right-of-way extends through the YTA, East DTA, and BRTA. An additional right-of-way for the Alaska Natural Gas Transportation System is adjacent to the Trans-Alaska Pipeline System right-of-way (USARAK 2006b).

Oil and gas extraction and production is a huge industry, with the largest reserves along the North Slope; however, there are limited reserves within the study area. Operations and leasing are managed by the BLM and Alaskan corporations. An active coal mining area is located around Healy, Alaska. Five coal-supplied power plants are located in the Fairbanks region.

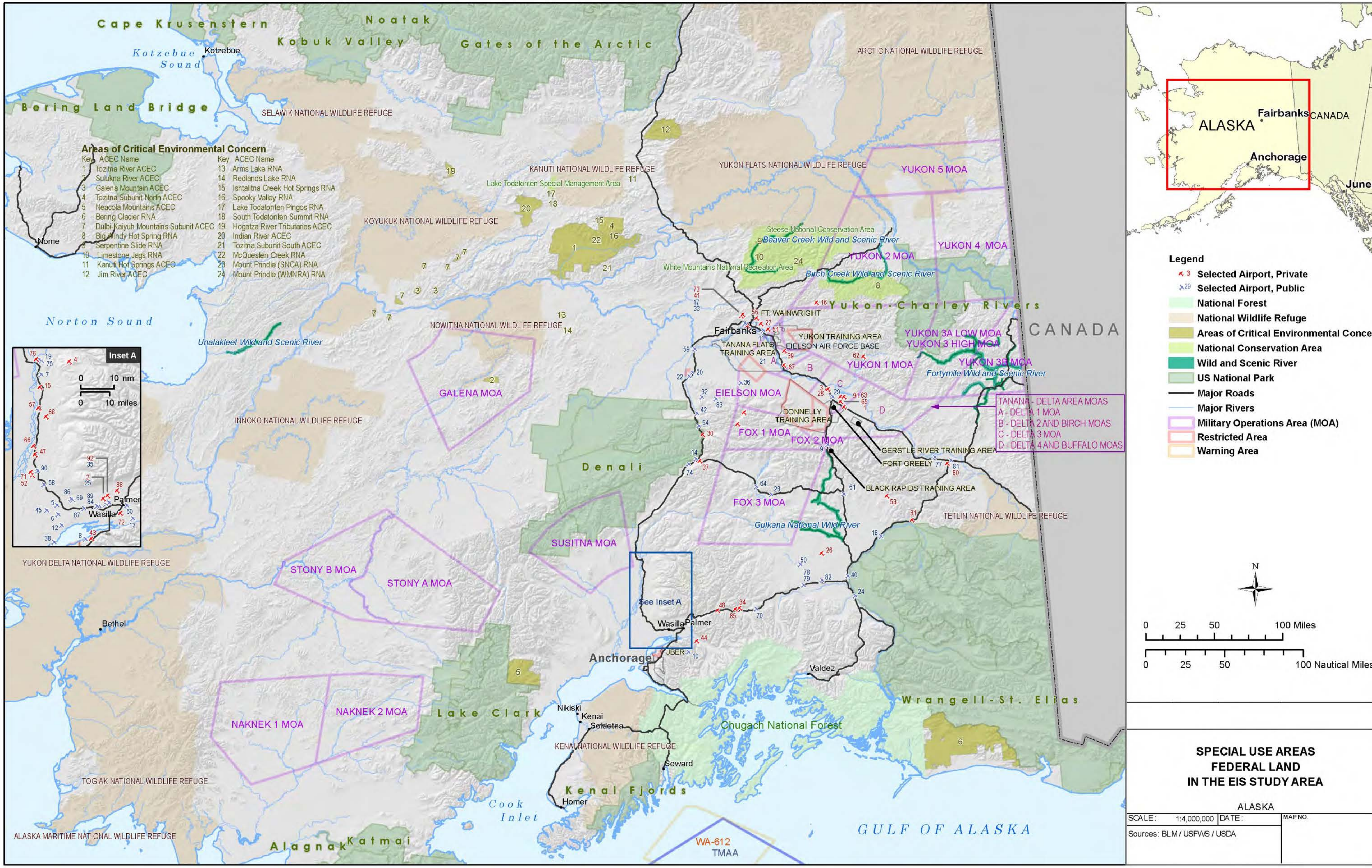

Figure B-18. Central Alaska Special Use Areas – Federal Land

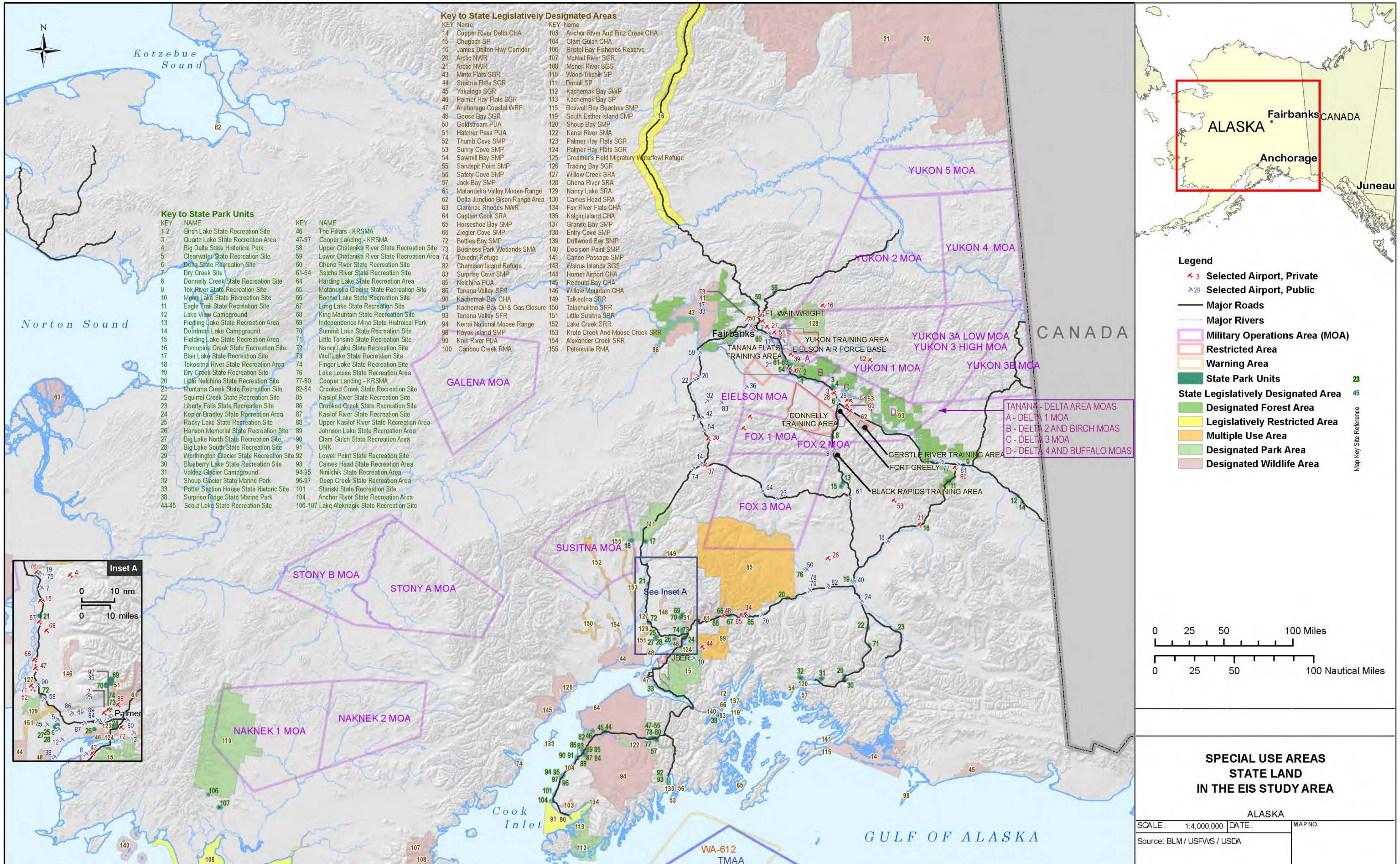

Figure B-19. Central Alaska Special Use Areas – State Lands

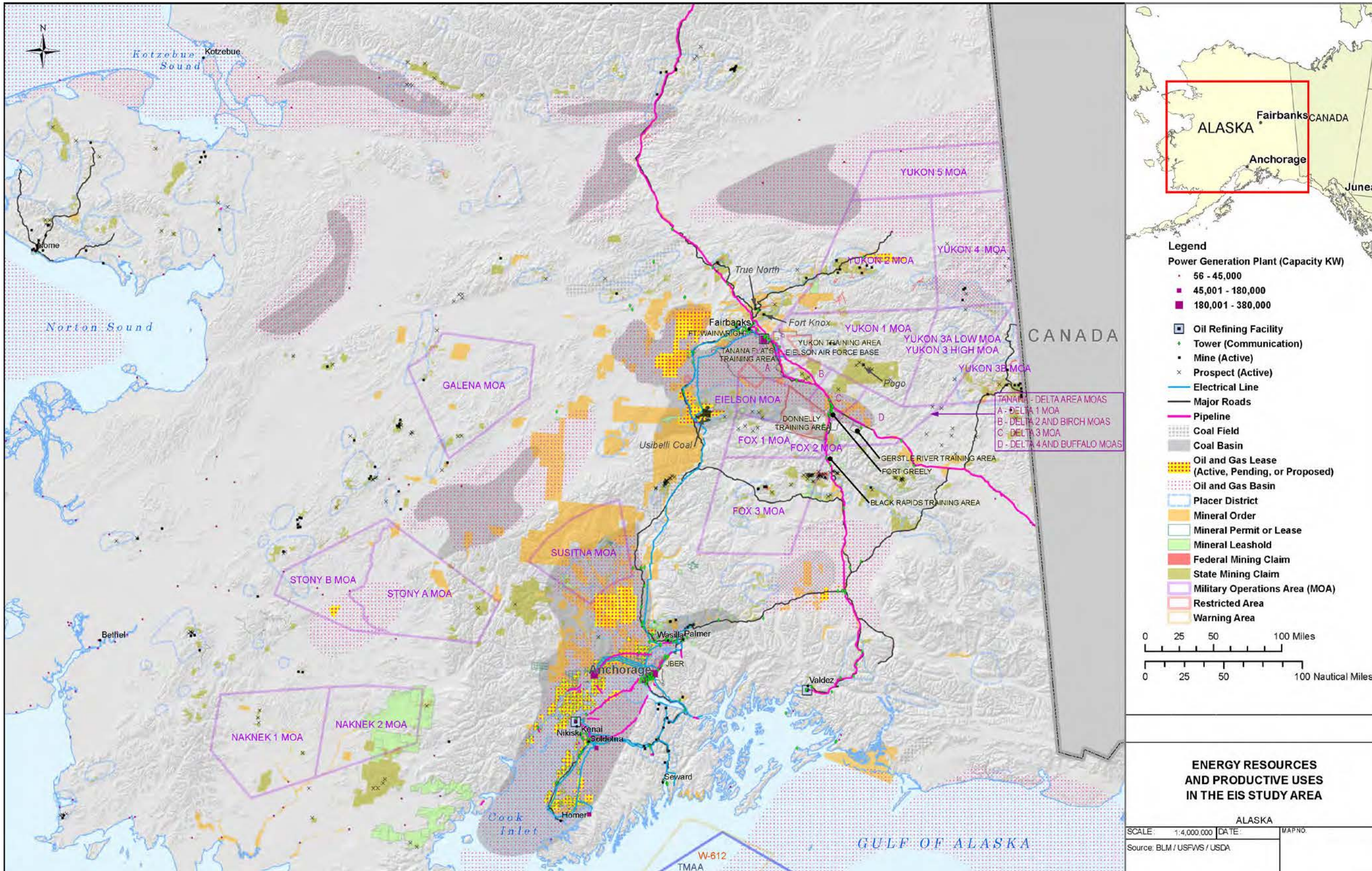

Figure B-20. Non-Renewable Energy Resources in Central Alaska

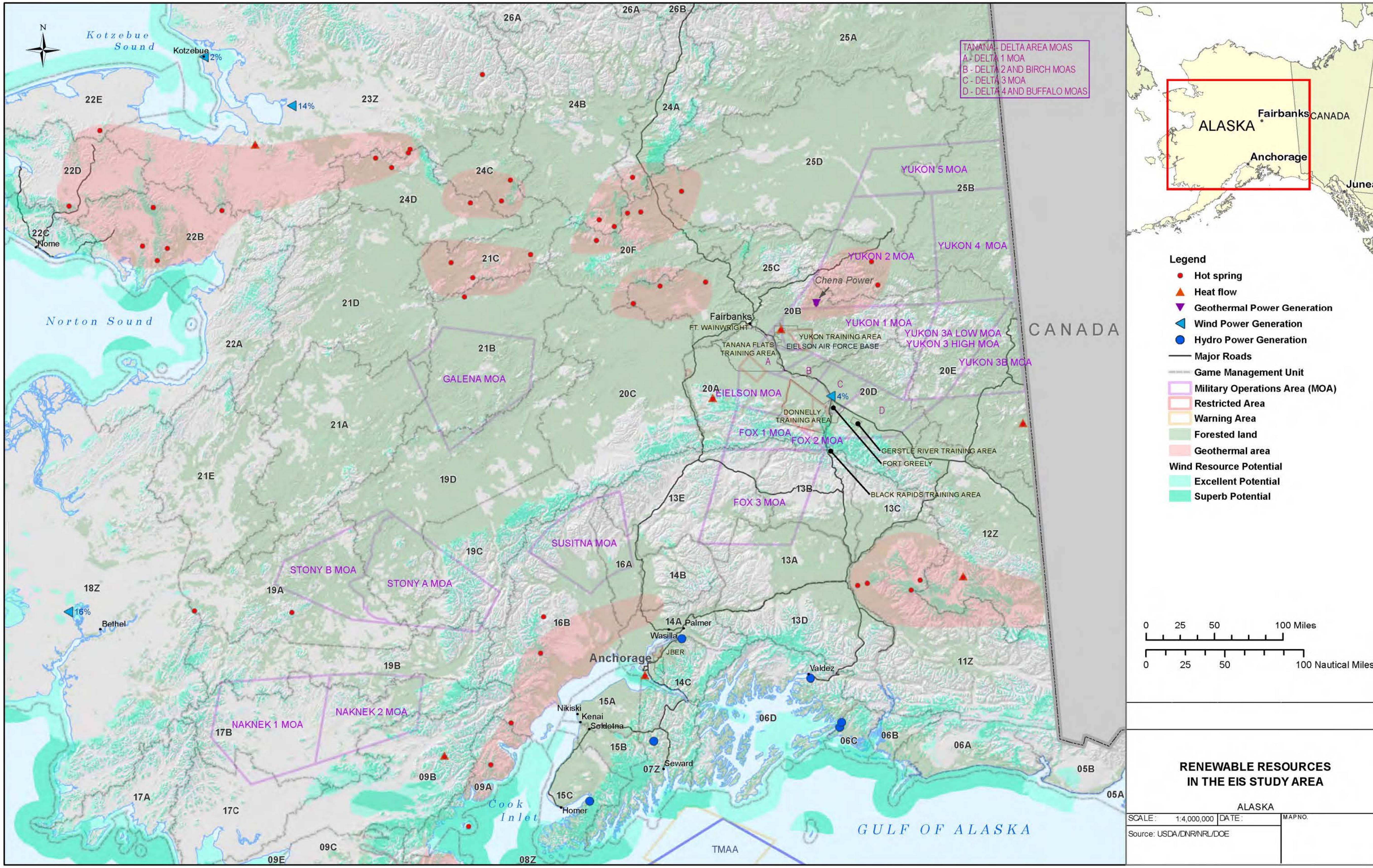

Figure B-21. Renewable Energy Resources in Central Alaska

Mining on Federal lands includes surface and underground mining of locatable, leasable, and saleable minerals, as defined by the Alaska Bureau of Land Management. Mining is excluded from a majority of Federal lands in Alaska, as such lands are typically designated national parks, preserves, monuments, wildlife refuges, or other areas on which mining ventures are restricted (ADNR 2010a).

Locatable minerals include precious metals, base metals, and uncommon rock varieties from the ground (USARAK 2006b). The potential for mining locatable mineral resources is ideal within the vicinity and south of Fairbanks. Gold is one of the primary resources found in the EIS study area, particularly northeast of Fairbanks. Small-scale placer mining occurs in discrete areas throughout the EIS study area.

Saleable minerals consist basically of construction materials such as sand, gravel, riprap, cinders, pumice, clay, limestone, and dolomite (USARAK 2006b). There is a potential to mine gravel and sand on Joint Base Elmendorf-Richardson (USARAK 2006b).

Recreational gold panning is not permitted on military lands. No commercial extraction of resources is permitted on military lands as per the BLM Resource Management plan within the military withdrawal agreement. Molybdenum Ridge on Fort Wainwright has potential molybdenum resource potential.

Renewable energy production in Alaska includes biomass, geothermal, hydroelectric, ocean energy, solar energy, and wind energy. The potential for renewable energy production within the EIS study area is excellent due to proximity to major populated areas (Fairbanks, North Pole, and Delta Junction) and the existence of conditions necessary to harness renewable energy resources. Locations of key renewable resource areas and sites are shown in Figure B-21. Geothermal production occurs at the Chena Power Plant northeast of Fairbanks. Wind energy potential is ideal along the Alaska Range from Mount McKinley to Tok and south-southeast of Anchorage.

Over 125 million acres of forested land in the State of Alaska is owned and managed by the Federal government, the State of Alaska, Alaska Native corporations, municipalities, private landowners, and trust lands. The Federal government and the state own the majority of the commercial grade forested lands (ADNR 2010b). Alaska's forests provide both timber (including lumber and firewood) and non-timber products. Despite past declines in the timber industry, small mills and other manufacturing facilities have shown some growth recently in the Anchorage and Fairbanks regions (ADNR 2006a) as locals look for cheaper heating sources as fuel prices have risen (ADNR 2010b). Forestry products (and harvesting) are expected to have significant growth in the south-central and interior portions of Alaska, including the Tanana Valley State Forest in the EIS study area (ADNR 2010b). Currently, forestry management and harvesting is focused in areas with existing infrastructure and lower production costs rather than remote inaccessible areas (ADNR 2010b). Non-timber products include herbs, foods, art materials, and tree sap to produce syrup (ADNR 2006b).

Agricultural cultivation in the State of Alaska includes crops and livestock (USDA 2007). The major crops are varieties of grains and root vegetables (USDA 2007). Select areas within Alaska provide a unique environment of extended daylight hours during the summer and suitable soils allowing hearty crop production despite extreme temperature ranges (Alaska Agriculture in the Classroom, Unknown). Alaska's top livestock markets are in aquaculture (i.e., farming of fish, crustaceans, and other aquatic life) and cattle (USDA 2007). The Matanuska-Susitna Valley (north of Anchorage) and Tanana Valley (east of Fairbanks) produce the most agricultural products within Alaska (AFB n.d.), although Anchorage and Juneau have the highest market value (USDA 2007). The University of Alaska Fairbanks also has field research sites for agriculture and forestry near Fairbanks, south of Gateway, and south of Delta Junction (UAF 2010). There is potential for agricultural farm growth in and around Fairbanks and Anchorage due to the favorable climate, soil types, and proximity to markets and transportation networks.

State of Alaska Mental Health Trust properties generally support productive uses (described above) for the purpose of producing revenue. The state also classifies lands based on attributes for particular productive or beneficial use. The general classifications used include habitat (conservation), forestry, agriculture, recreation, and settlement. Commercial timbering occurs on Federal and state land, following prescriptions and stipulations for maintaining sustainable yields. Also, several major rivers in the EIS study area provide exceptional fishing resources. These serve commercial, subsistence, and personal use/recreational users. Several lakes and rivers are stocked by the ADNR in order to sustain yields in accessible areas for these various users.

Private Land (Including Native Land). This category includes urbanized land devoted to a variety of public and private uses. Typical land use categories include residences (single- and multifamily residences and mobile homes), offices and businesses, retail stores, restaurants and lodging, commercial operations (e.g., auto shops), industry and manufacturing, warehousing, utilities and transportation networks, and community services (e.g., schools, churches, hospitals, local government). Ownership may be public or private, and generally must conform to ordinances of the governing jurisdiction. Most land use is encumbered (through ownership rights both surface and subsurface) which influences potential options for future use. Native lands are encumbered by amendments to the ANCSA and, as a result, specific developments or usage may be precluded.

Locations of Concern. During public scoping for the EIS, members of the public and agencies provided information and expressed concern about potential impacts of the EIS proposals in many areas. Many comments included descriptions of specific or general locations and the associated activity, resource, or value. Figure A–1 and Table A–6 in Appendix A shows these locations in the EIS study area.

B.10.3.2 Public Access

For the EIS, public access is defined as access of the public to Federally and state-owned property, including the navigable or public waters of the state and RS 2477 rights-of-way.

Public Access to Military Lands. In accordance with the Sikes Act, installations seek to provide access to military land for public use to the extent possible while meeting the primary purpose of the military mission. Beyond that, security and safety are the limiting factors. Consequently, some areas are defined as off-limits or have access restrictions. Public access is managed and controlled by a permit system. With a permit, private citizens may access military lands for a variety of recreational uses, such as hunting, fishing, trapping, and ORRV use. Permit holders must follow procedures for checking in prior to entering military land and follow particular seasonal or daily restrictions. USARAK allows for the following modes of access:

- *Ground vehicle* (car and truck) use is allowed on maintained roadways. Ground vehicles must obey all military rules and regulations involving posted speed limits and are not allowed in restricted areas.
- *Boats* are considered those aquatic vehicles that require open channels and waterways to operate. Boat access is allowed in some areas of military installations. As boats are already limited to open waterways, there are only certain areas available for boat use. Boats may not operate in restricted areas, some of which may have waterways flowing through them.
- *Off-road recreational vehicles* include motorized vehicles such as snowmobiles, all-terrain vehicles (three- and four-wheeled), and airboats, which do not require maintained roads or open waterways. ORRV use is allowed on maintained roadways and trails in designated areas. Military regulations describe the restrictions for each installation. ORRV use also varies seasonally. Three- and four-wheeled all-terrain vehicles are common ORRVs during summer,

while many recreators use snowmobiles on military lands in the winter. ORRVs usually stay on cleared trails, and snowmobiles often use frozen waterways in winter as corridors.

- *Aerial access* involves small aircraft, such as single-engine planes and ultralight aircraft. Public aerial access is allowed over military lands, subject to military and FAA regulations. USARAK Regulation 350-2 addresses use of restricted airspace over USARAK lands. Further information on airspace use over military lands can be found in Section B.1, Airspace Management and Use.

Unauthorized access or illegal entry onto military land is the most common form of trespass. Only a small portion of each installation's boundary is fenced or posted with installation boundary signs. Crossing installation boundaries or the internal boundary of an off-limits area without approval constitutes trespass.

Accessible Areas on Military Land. The USARAK has defined four primary categories of use areas on its lands: Open Use, Modified Use, Limited Use, and Off-Limits Areas. These recreational categories, defined below, are subject to periodic change or restrictions.

- *Open Use Areas* are those areas that are available year-round for all forms of recreation. Ground and ORRV access and vehicular use are permissible in this area.
- *Modified Use Areas* are those areas that are open year-round to all nonmotorized forms of recreation. Motorized vehicular recreation or access is limited to those frozen periods with six or more inches of snow cover. Modified Use restrictions are largely applicable to USARAK's wetlands.
- *Limited Use Areas* are closed to all forms of recreation at all times. This is due primarily to either conflicts with military use and the primary military mission, or to human health and safety issues.
- *Off-Limits Areas* include impact areas that are only accessible to trained military personnel.

General categories of military land use affecting public access are urban areas (cantonment), training areas and nonfiring facilities, firing ranges, SDZs, nondudded impact areas, and dudded impact areas. The degree of hazard (and whether permanent or discontinuous) is a determining factor. The military is required to post warning signs near all permanently closed and/or dangerous areas.

Public Access to Nonmilitary Lands. Federal and state statutes and management plans govern special management intent for, accessibility to, and use of any particular area. Land managers have the authority to close or restrict all or some public use or activities within its jurisdiction. The managing agency may close an area either temporarily or permanently to conserve resource values or for public safety concerns (such as during a high fire hazard period). Access to nonmilitary public lands varies depending on the facility, but typically occurs via ground transportation, watercraft, or aerial access, and in some areas via snow machines, foot travel, bicycle, and pack animal.

Surface transportation between Alaska's rural communities and public areas relies heavily on cross-country trails, primarily used in winter by snow machines, dogsled teams, and four-wheel all-terrain vehicles (ADNR 2000b). Typically, RS 2477 rights-of-way are available for public use under ADNR's regulations. The location of the RS 2477 network of roads and trails in the EIS study area is shown in Figure B-22. A description of RS 2477 rights-of-way within the region of influence for each proposed action is provided in Chapter 3.

Alaska statutes protect the public's right to access and use navigable and public waters regardless of who owns the underlying bed. A navigable water body under state law includes waters of the state that are navigable for any useful purpose, including boating, hunting, fishing, and other recreational activities

(AS 38.05.965(13)). Public water also includes habitat for fish and wildlife in which there is a public interest (AS 38.05.965(18)). Any land below the ordinary high water mark of navigable or public waters is generally accessible for recreational or other purposes such as fishing, trapping, boating, and hunting. A more-detailed description of public access on specific navigable or public waters of the state within the ROI for each proposed action is provided in Chapter 3.

B.10.3.3 Recreation

Outdoor recreation includes, but is not limited to, activities such as camping, water sports, river floating, powerboating, mountain climbing, photography, sightseeing, hiking, cross-country skiing, snowshoeing, dog mushing, snow machining, wildlife watching, sport hunting, and sport fishing. Most of the 322 million acres of public land in Alaska are available for recreation, and about 168 million acres are specifically managed for wildland recreation. Twenty-five of the rivers in Alaska comprising over 3,200 river miles are protected by national WSR designations. As a result, recreation in Alaska is highly valued for both quality of life and economic reasons.

Recreation on Military Land. Recreation on military lands is managed in accordance with appropriate Federal and state policies and regulations. In addition, each installation manages outdoor recreational opportunities through its INRMP. This section generally addresses recreational opportunities on military lands in Alaska. A more-detailed description of recreation on specific military lands within the ROI for each proposed action is provided in Chapter 3.

Hunting, Trapping, and Fishing. Military lands support numerous game species (moose, bear, caribou, bison, and small game). Hunting, trapping, and fishing are conducted under ADFG regulations to ensure a sustainable harvest of fish, game, and furbearer species. The military determines which areas are available and dates in coordination with ADFG seasons. Military installations also may institute fishing, hunting, and trapping regulations (including season closures, creel limit decreases, or bag limit decreases) that are more restrictive than those of the ADFG. Hunters must hold state hunting licenses and follow all Federal and state guidelines while hunting on military property. Hunting occurs on military lands throughout the year, with the most activity in the fall. Most big game seasons begin in August or September.

Trapping occurs on some military lands. Popular furbearer species for trapping include lynx, beaver, pine marten, and fox.

Fishing is a popular recreational activity on military lands. In addition to naturally existing populations of many sport fish, there are a number of stocked lakes on military lands. The ADFG is responsible for maintaining stocked fish populations on military lands.

As an indicator of recreational use, the reported number of hunters using YTA between 2001 and 2004 was 500 to 800 annually, and in TFTA it was between 800 and 1,200 annually (ASCG 2006).

Off-Road Recreational Vehicles. ORRVs and watercraft are used in association with many activities in Alaska. These vehicles are used to access hunting, fishing, and trapping areas, for recreational riding, and for other activities. Military lands may be designated for one or more types of ORRV use in response to a demonstrated need, providing there are sufficient suitable areas available. Areas and trails are typically classified as either open to the public with access controlled by manageable quotas, or closed to the public.

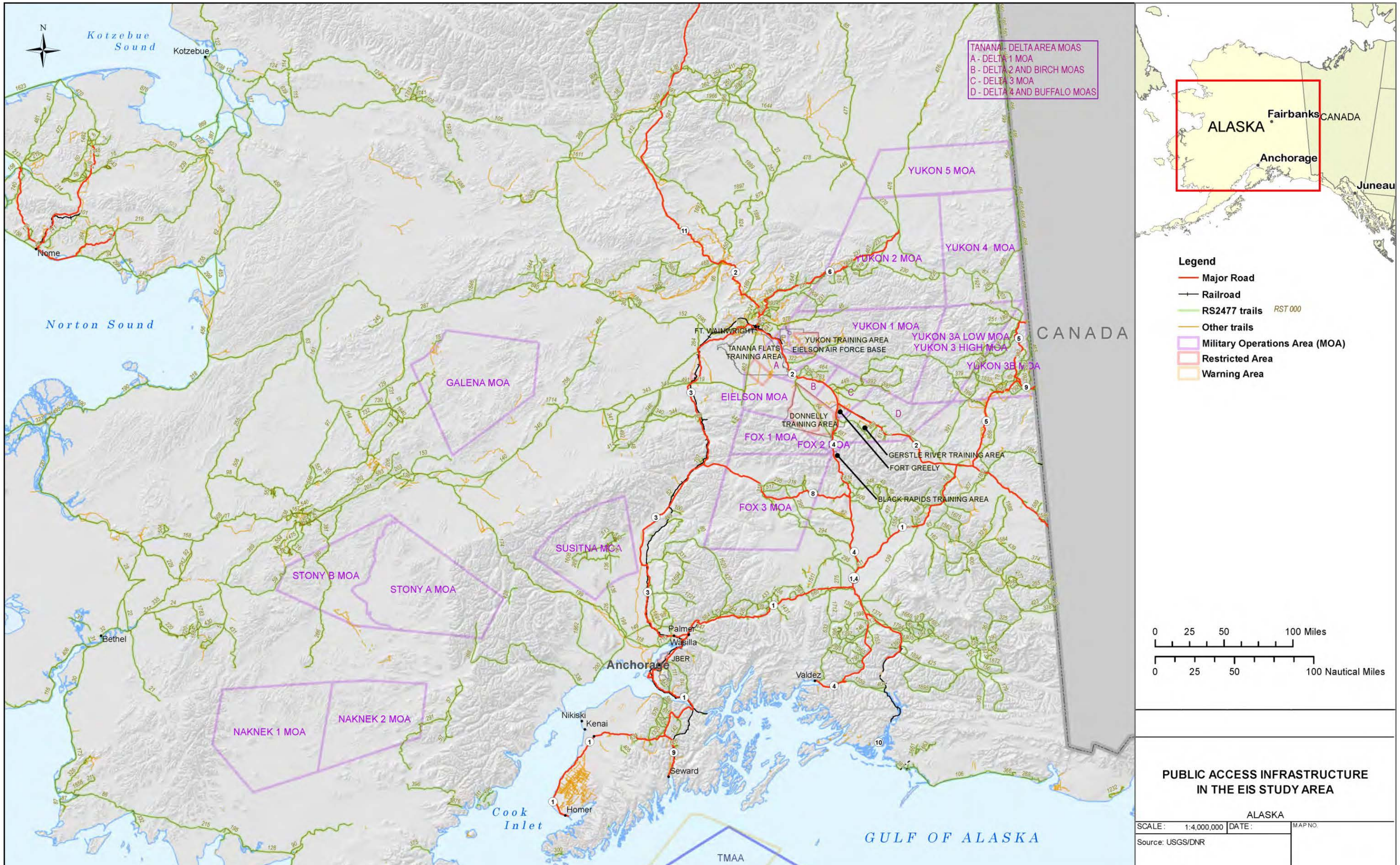

Figure B-22. Public Access Infrastructure in Central Alaska

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Trail Use. Hiking opportunities exist within most military locations. Hiking is most popular in mountainous or hilly terrain and much less popular throughout lowland and wet areas. Hiking on military land usually occurs on training and maneuver trails.

Camping. Overnight camping on military lands is permitted within designated areas with a Recreational Access Permit. Camping is not permitted in cantonment areas, except for designated fee campgrounds. In some areas, cabins are available along trail systems for overnight use in conjunction with hiking or skiing.

Boating and Rafting. Boating and rafting are popular recreational activities on authorized lakes on military properties. All persons using watercraft are subject to Alaska state law with regard to safety and registration requirements. In addition, most installations require that individuals wear Coast Guard-approved personal flotation devices while operating boats or rafts on installations. Boating and rafting occurs mainly during the summer months.

Recreation on Nonmilitary Public Land. Several nonmilitary public lands within the ROI of this EIS provide recreation opportunities. The following discussion focuses on the main types of recreational areas under Federal and state ownership in the ROI and their associated recreational uses. There are other smaller state, regional, and local parks and recreation areas in the ROI that support a spectrum of recreational activities. Specific recreational uses and locations within the ROI for each proposed action are discussed in Chapter 3.

National Parks and Preserves. NPS is a bureau of the DOI whose fundamental purpose is to promote and regulate the use of national parks, monuments, and reservations under its control. Two national parks and preserves are located within the EIS study area. National parks generally have a minimum overflight restriction to preserve a level of quietude. Denali National Park and Preserve and the Yukon-Charley River National Preserve are located within the EIS study area. Further description of this area is provided in Appendix I, *Land Use, Public Access, and Recreation.*

National Forests. The USFS is an agency of the U.S. Department of Agriculture that administers the nation's 155 national forests and 20 national grasslands, which encompass 193 million acres. Major divisions of the agency include the National Forest System, State and Private Forestry, and the Research and Development branch. USFS Region 10, based in Juneau, Alaska, oversees Alaska's two national forests.

National Wildlife Refuge Lands. The National Wildlife Refuge System administers a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States. Minimum flying altitude restrictions (generally 5,000 feet AGL) are in effect in military training airspace over most national wildlife refuges to preserve a level of quietude. Only the Yukon Flats National Wildlife Refuge is within the EIS study area.

National Wild and Scenic Rivers. National WSRs are protected areas in the United States that are preserved because they possess remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values. These WSRs are preserved in their free-flowing condition. In Alaska, national WSRs include 25 rivers managed by Federal agencies (e.g., BLM, USFWS, NPS) or state government. Four National Wild and Scenic Rivers are located within the EIS study area: Delta WSR, Gulkana Wild River, Birch Creek WSR, and Fortymile WSR.

Fishing and Game Activities. Fish and game activities are regulated by the ADFG. Subsistence use of fish and wildlife resources is discussed in Section B.13, Subsistence.

Individuals must have a Sport Fishing License to participate in sport fishing in Alaska. The ADFG divides the state into three major regions (interior, south-central, and southeast), which are further broken down into individual management units. Alaska is home to 10 species of big game animals and also offers small-game and waterfowl hunting opportunities. The ADFG established 26 Game Management Units (GMUs) to effectively manage and control hunting in Alaska. The locations of GMUs in the EIS study area are shown in Figure B-21. Each GMU is managed to provide hunters with an optimal experience and ensure appropriate control of game populations from year to year. The ADFG decides which species are harvestable, and at what levels and locations. Additional information about the portions of GMUs 20, 13, 14, and 25 within the EIS study area are described in Appendix I, *Land Use, Public Access, and Recreation*. The two primary affected units are the following:

- *GMU 13* consists of the area that lies to the west of the east bank of the Copper River and is drained by all tributaries into the west bank of the river. GMU 13 is divided into five subunits: Units 13A through 13E. Game species managed within GMU 13 include caribou, mountain goat, bison, moose, Dall sheep, brown/grizzly bear, and black bear.
- *GMU 20* consists of the Yukon River drainage upstream from and including the Tozitna River drainage to and including the Hamlin Creek drainage; drainages into the south bank of the Yukon River upstream from and including the Charley River, Ladue River, and Fortymile River drainages; and the Tanana River drainage north of Unit 13 and downstream from the east bank of the Robertson River. GMU 20 is divided into six subunits: Units 20A through 20F. Game species managed within GMU 20 include caribou, bison, moose, Dall sheep, brown/grizzly bear, and black bear.

State Parks and Recreation Areas. State Park and Recreation Areas provide a broad spectrum of outdoor recreation opportunities, while protecting the area's natural values. These areas are managed by the ADNR Division of Parks and Outdoor Recreation. There are sixteen state park and recreation areas within the EIS study area including: Birch Lake State Recreation Area, Chena River State Recreation Area, Clearwater State Recreation Site, Delta State Recreation Area, Donnelly Creek State Recreation Site, Fielding Lake State Recreation Area, Harding Lake State Recreation Area, Lake Louise State Recreation Area, Quartz Lake State Recreation Area, and Salcha River State Recreation Area.

State Forest. State Forests are managed by the ADNR Department of Forestry and provide for multiple uses and sustained yield of renewable resources. There is one state forest, Tanana Valley State Forest, located within the EIS study area.

Public Use Areas. Public use areas are legislatively designated areas established for special multiple use management of state public land and water resources by ADNR, and management of public wildlife resources by the ADFG.

Moose Range. Moose ranges maintain, improve, and enhance moose populations, wildlife habitat, and other wildlife resources; and perpetuate public multiple use. These areas are managed jointly by the ADNR and the ADFG. There is one moose range, the Matanuska Valley Moose Range within the EIS study area.

B.11 INFRASTRUCTURE AND TRANSPORTATION

B.11.1 Definition of Resource

Analysis of infrastructure considers the utility systems required to support JPARC and other users of public utility systems. It includes the capacities of the electric power transmission and distribution system, natural gas and liquid fuel (fuel oil, diesel fuel, and gasoline) supply systems, and the water supply system to meet the demands of all their existing and planned users.

Transportation is the multimodal network of roads, railways, and trails that link centers of population or activity and provide access to remote areas within the study area. The ability of current systems to handle anticipated traffic and provide for access are key attributes to consider when evaluating transportation.

B.11.2 Regulatory Setting

EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (January 24, 2007), sets goals for Federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions and in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (October 5, 2009), sets goals for the expansion of the energy reduction and environmental performance requirements of EO 13423. EO 13514 sets numerous Federal energy requirements in several areas, including accountability and transparency, strategic sustainability performance planning, greenhouse gas management, sustainable buildings and communities, water efficiency, electronic products and services, fleet and transportation management, and pollution prevention and waste reduction. Activities under all of the alternatives would have to be conducted to comply with this order. While military training functions and support are generally excluded from the requirements of the EO, DoD and the various Services have established policies and goals for improving performance, and there are benchmarks for considering how proposals may impact achievement of the goals.

The Clean Water Act (33 U.S.C. 1151 et seq.; 33 U.S.C. 1251 et seq.) is the basic Federal legislation governing wastewater discharges. The implementing Federal regulations include the NPDES permitting process (40 CFR 122), general pretreatment programs (40 CFR 403), and categorical effluent limitations, including limitations for pretreatment of direct discharges (40 CFR 405 et seq.).

The Federal Water Pollution Control Act/Clean Water Act, Section 404, Dredged or Fill Permit Program (33 U.S.C. 1344) regulates development in streams and wetlands by requiring a permit from the Army Corps of Engineers for discharge of dredged or fill material into navigable waters. A Section 401 (33 U.S.C. 1341) Certification is required from the state as well.

The Safe Drinking Water Act (42 U.S.C. 300f et seq.) requires the promulgation of drinking water standards, or maximum contaminant levels, which are often used as cleanup values in remediation; establishes the underground injection well program; and establishes a wellhead protection program.

AR 420-1, *Army Facilities Management* (Army 2008b), establishes the policies and responsibilities for the operation, maintenance, repair, and construction of facilities and systems for the efficient, economical, and environmentally sound management of utility services at all Army installations.

USARAK Regulation 55-2, *Transportation Operations and Planning in Alaska* (USARAK 2001), provides detailed regulations for convoy preparation and implementation.

AFI 32-7041, *Water Quality Compliance* (Air Force 2003), instructs the Air Force on maintaining compliance with the CWA; other Federal, state, and local environmental regulations; and related DoD and Air Force water quality directives.

AFI 32-7064, *Integrated Natural Resources Management* (Air Force 2004a), sets forth requirements for addressing wetlands, floodplains and coastal and marine resources in an INRMP for each installation.

There are no specific regulations associated with electrical or natural gas infrastructure or supply.

B.11.3 General Description of Affected Environment

B.11.3.1 Infrastructure

B.11.3.1.1 Regional Energy Supplies

Alaska's electrical infrastructure is different from that of the lower 48 states, which rely on a comprehensive interconnected grid for power transmission. Alaska has only one primary interconnected grid that serves the two major population centers of the state. The layout of the overall system is shown in Figure B-23. This transmission corridor is known as the Railbelt Service Area. All other transmission lines are considered part of the non-Railbelt Alaska.

Railbelt Service Area. The Railbelt Service Area consists of a corridor stretching from the Kenai Peninsula to Delta Junction along the Parks and Richardson Highways (Figure B-24). The corridor includes the two major population centers of the state: Anchorage and Fairbanks. The Railbelt Service Area is served by six utilities: Golden Valley Electric Association (GVEA), Chugach Electric Association (CEA), Matanuska Electric Association, Homer Electric Association (HEA), Anchorage Municipal Light & Power (ML&P), and the City of Seward Electric System (SES). These utilities, along with state-owned assets, serve roughly 75 percent of Alaska's population and account for over 80 percent of the electricity generated in the state.

The primary types of generating plants in the Railbelt include gas-fired, oil-fired, and hydroelectric. The five largest plants include Beluga (CEA, gas-fired), George M. Sullivan (ML&P, gas-fired), Bradley Lake (CEA, hydroelectric), North Pole (GVEA, oil-fired), and Anchorage Plant No. 1 (ML&P, gas-fired).

Transmission within the Railbelt is typically divided into three main load centers: northern, central, and southern. It is assumed that power flows freely within each load center without transmission constraints. GVEA is the lone provider within the northern load center. Their primary transmission assets include a 138-kilovolt (kV) line from Healy to Delta Junction and the Northern Intertie. The Northern Intertie is a redundant and much-needed 97-mile, 230-kV line between Healy and Fairbanks that reduces line losses, increases the transfer capacity, and improves reliability. The northern load center is connected to the central load center via the Alaska Intertie. The Alaska Intertie is a 170-mile, 345-kV line (operated at 138 kV) between Healy and Willow that is owned by the Alaska Energy Authority. The transfer capability between the Intertie and the northern load center transmission lines is assumed to be 75 megawatts (MW) and 140 MW.

The central load center consists of the CEA, Matanuska Electric Association, and ML&P service areas and has multiple transmission lines with capacities of 230-, 138-, and 115-kV. The central load center is tied the southern load center via CEA's Southern Intertie. The Southern Intertie is a 135-mile, 115-kV transmission line with an assumed transfer capability of 75 MW. The southern load center consists of the HEA and SES service areas, which operate 115- and 69-kV transmission lines.

Non–Railbelt Alaska. Non–Railbelt Alaska is diverse; it contains both rural and urban customers and both roadless and road-accessible communities. These communities rely on their own power sources, which typically involves the use of diesel generators. Their most common energy denominator is that none of the areas are connected to the Railbelt energy grid. The largest non–Railbelt Alaska cooperative within the study area is the Copper Valley Electric Association (CVEA). CVEA's service areas are connected with a 106-mile, 138-kV transmission line between Valdez and Glennallen. The transmission line is owned by the Four Dam Pool Power Agency but is operated by CVEA.

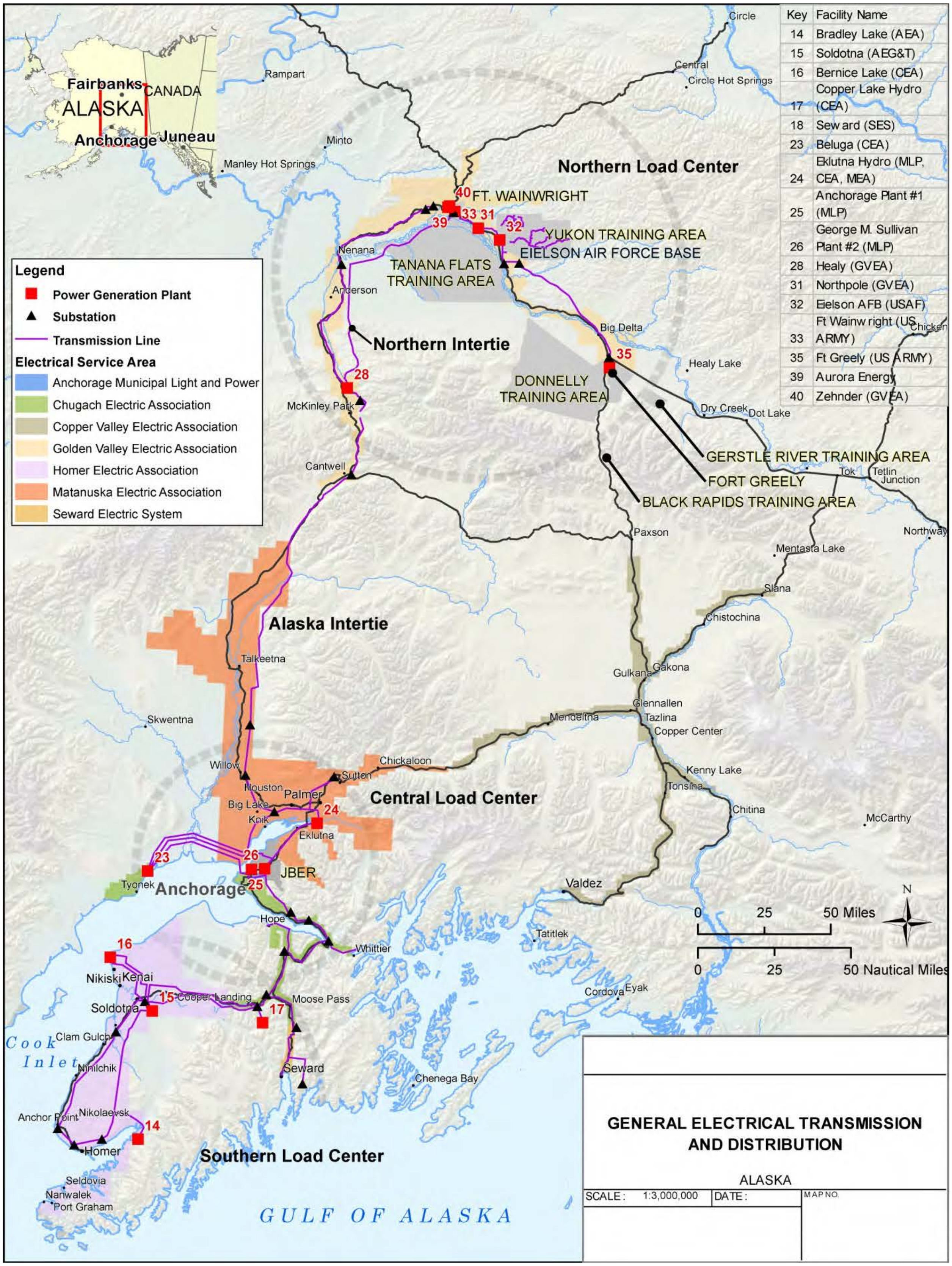

Figure B-23. General Electrical Transmission and Distribution

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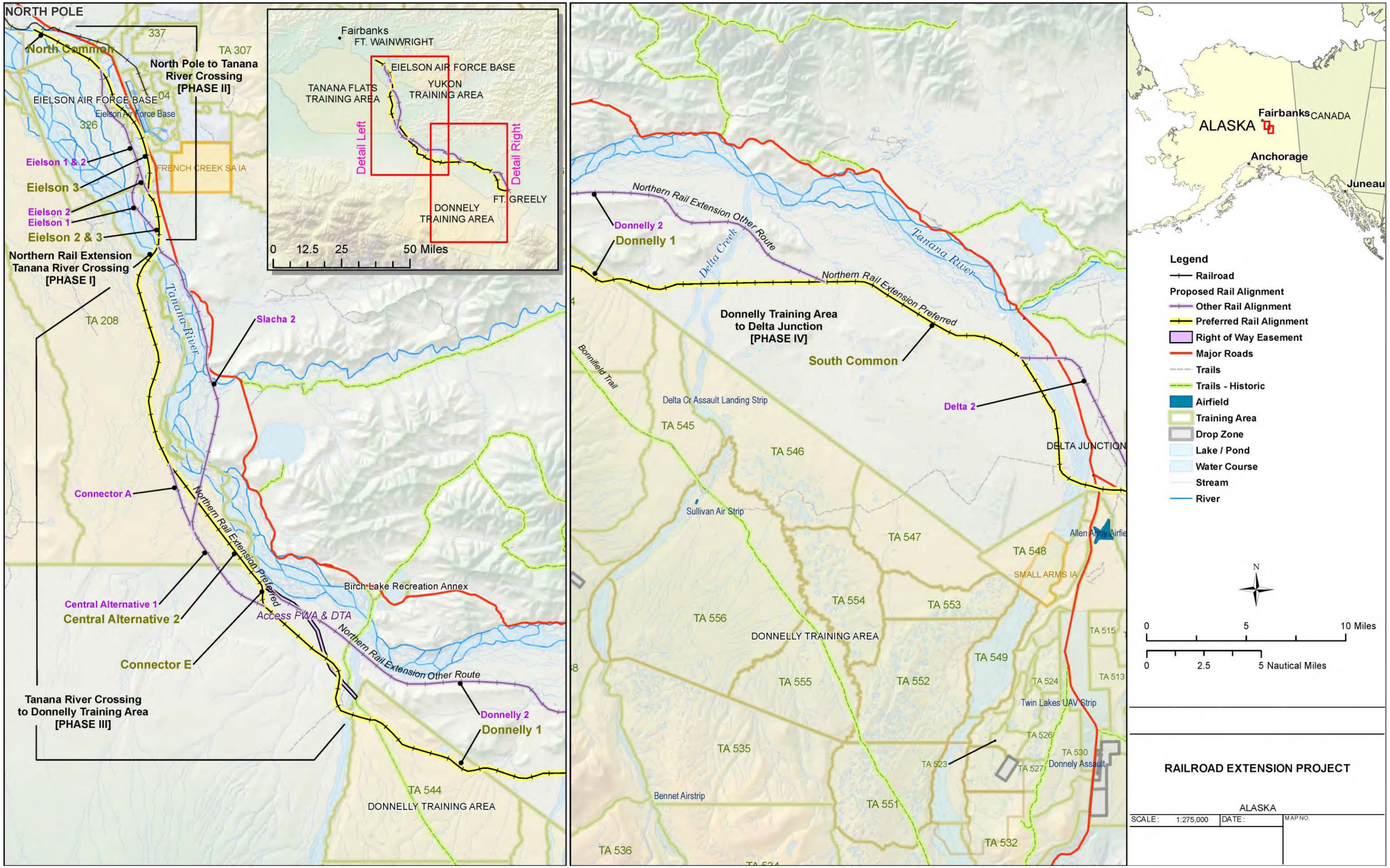

Figure B-24. Northern Rail Extension Project

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Military Installations and Training Areas Energy Supply. Electricity, water, sewage, and natural gas are necessary to support various missions and to maintain the residences of military personnel. An extensive system supplies these resources to personnel at JPARC facilities and training areas, with the highest concentration of infrastructure in primary installation cantonments (i.e., JBER, Fort Wainwright, Eielson AFB, and Fort Greely).

In 2007, a 50-year contract was awarded to Doyon Utilities for assumption of ownership, operation, and maintenance of the electric power generation and distribution systems, central heat and heat distribution systems, natural gas distribution systems, potable water distribution systems, and the wastewater collection systems of USARAK facilities, including JBER, Fort Wainwright, and Fort Greely. Aurora Energy serves as a subcontractor for the operation of electric power and heat utilities and power generation assets. In addition to the three installations listed above, the contract includes three remote sites: Black Rapids, Bolio Lakes, and YTA.

Yukon Training Area. YTA is supplied with power from GVEA and by the Eielson AFB power plant. Electrical distribution lines extend northeast into and around the Chena River Research Site and along primary roads within the training area. Where overhead power is not available; constant-run generators are used for power generation.

Donnelly Training Area. Electrical distribution within DTA is limited to the area east of the Delta River. Within this area, however, not all range facilities have electric power. DTA falls within the GVEA service area.

Tanana Flats Training Area. Currently no commercial power is available in TFTA. GVEA's Northern Intertie is routed along the northwestern and northern sections of TFTA.

B.11.3.1.2 Water Supply

The cities of Anchorage and Fairbanks overlie coarse-grained alluvial aquifers, which yield large quantities of rather high-quality water; information on groundwater outside Alaska's urban areas is sparse (USGS 1999). Permafrost presents unusual groundwater development and withdrawal problems, and continuous permafrost yields little groundwater. Maintaining a potable water supply could pose a challenge for military activities in areas without a water supply infrastructure. Groundwater exploration should be conducted prior to siting military activities with long-term water requirements. In 2000, the water utilities in the Anchorage, Fairbanks, and Juneau areas used 61 percent of all water withdrawn in the state for public supply. The mean rate of water withdrawn by the principal public-supply utilities servicing these three areas from January 1990 to September 2005 has ranged from a monthly minimum of 3 million gallons per day in Juneau to a maximum of 48 million gallons per day in Anchorage. Higher-usage periods occur during the summer months in Anchorage and Fairbanks due to tourism, commercial activity, industrial activity, and seasonal climatic effects (USGS 2005).

In 2000, Alaska's average usage of water was 190 gallons per day per person, while the nation´s average was 180 gallons per day. Approximately 70 percent of Alaska's public-water supply comes from surface water in these three cities, while ground water is the source for the remainder. The greater Fairbanks area's water supply is taken from four wells along the Chena River. The primary water treatment plant produces nearly 1.3 billion gallons of treated water annually. Due to the Arctic environment, the entire water treatment and storage process takes place indoors (USA 2011). Juneau obtained 71 percent of its public-supply water from groundwater sources in 2005; for Fairbanks, the figure was 100 percent (USGS 2005).

B.11.3.2 Surface Transportation

The study area broadly covers southeast Alaska from JBER in southern Alaska, near Anchorage; Fort Wainwright and Eielson AFB in central Alaska, near Fairbanks; and Fort Greely in central Alaska, near Delta Junction. Situated within this region are a number of military land-based training areas, including YTA and TFTA, near Fort Wainwright and Eielson AFB; DTA and GRTA, near Fort Greely; and BRTA, just south of Fort Greely.

Interstate Highways. Alaska's interstate highways are concentrated in the south-central region of the state. The interstate highways in that area include A1, A2, A3, and A4. These highways are not typically known in Alaska by their interstate designations on any available Alaska Department of Transportation maps or on any highway/roadway signage. Rather, the interstate and state highways are known and signed primarily by their highway name and secondarily by their Alaska state highway (SH#) number (Figure B-25).

Below is a brief description of the four interstate highways within the study region and in the entire State of Alaska. Table B–17 provides more-detailed descriptions of these interstate highways.

- ***Interstate A1***. From Anchorage, Interstate A1 runs in a northeasterly direction to Tok, then in a southeasterly direction to the Canadian border. The segment from Anchorage to the Gakona junction at SH4 is also designated as SH1 and Glenn Highway. The segment from the Gakona junction to Tok is also designated as SH1 and the Tok Cut-Off Highway. The third segment from Tok to the Canadian border is also designated as SH2 and the Alaska Highway.
- ***Interstate A2***. Originating in Fairbanks, Interstate A2 runs in a southeasterly direction to Tok. The interstate is also known as SH2 and Richardson Highway from Fairbanks to Delta Junction and as SH2 and the Alaska Highway from Delta Junction to Tok.
- ***Interstate A3***. From Anchorage, Interstate A3 runs in a southeasterly direction around the Turnagain Arm of Cook Inlet, then in a southwesterly direction to Soldotna. The segment from Anchorage to the junction of SH9 is also known as SH1 and the Seward Highway. From the SH9 junction to Soldotna, the segment is also known as SH1 and the Sterling Highway.
- ***Interstate A4***. From Fairbanks, Interstate A4 runs in a southerly direction to the junction of Interstate A1 on the east side of Wasilla. Interstate A4 is also known as SH3 and the George Parks Highway.

State Highways. The state highways within the region that are also on the National Highway System (NHS) include SH1, SH2, SH4, SH9, and SH11. As described above, these state highways are known and signed primarily by their highway name and secondarily by their Alaska SH# number. The following is a brief description of the five NHS state highways within the study region.

- ***State Highway 1***. SH1, also known as Sterling Highway, runs in a northerly direction from Homer to Soldotna. SH1 continues past Soldotna in a northeasterly direction as Interstate A3 to Anchorage and Interstate A1 to Tok.
- ***State Highway 2***. The northern route of SH2 is known as the Steese Highway from Fairbanks to Fox. SH2 continues as Elliot Highway in a northwesterly direction from Fox to Livengood. The southern route of SH2 is known as Richardson Highway from Fairbanks to Delta Junction and the Alaska Highway from Delta Junction to the Canadian border. The southern route of SH2 is also designated as Interstate A2 from Fairbanks to Tok and Interstate A1 from Tok to the Canadian border.

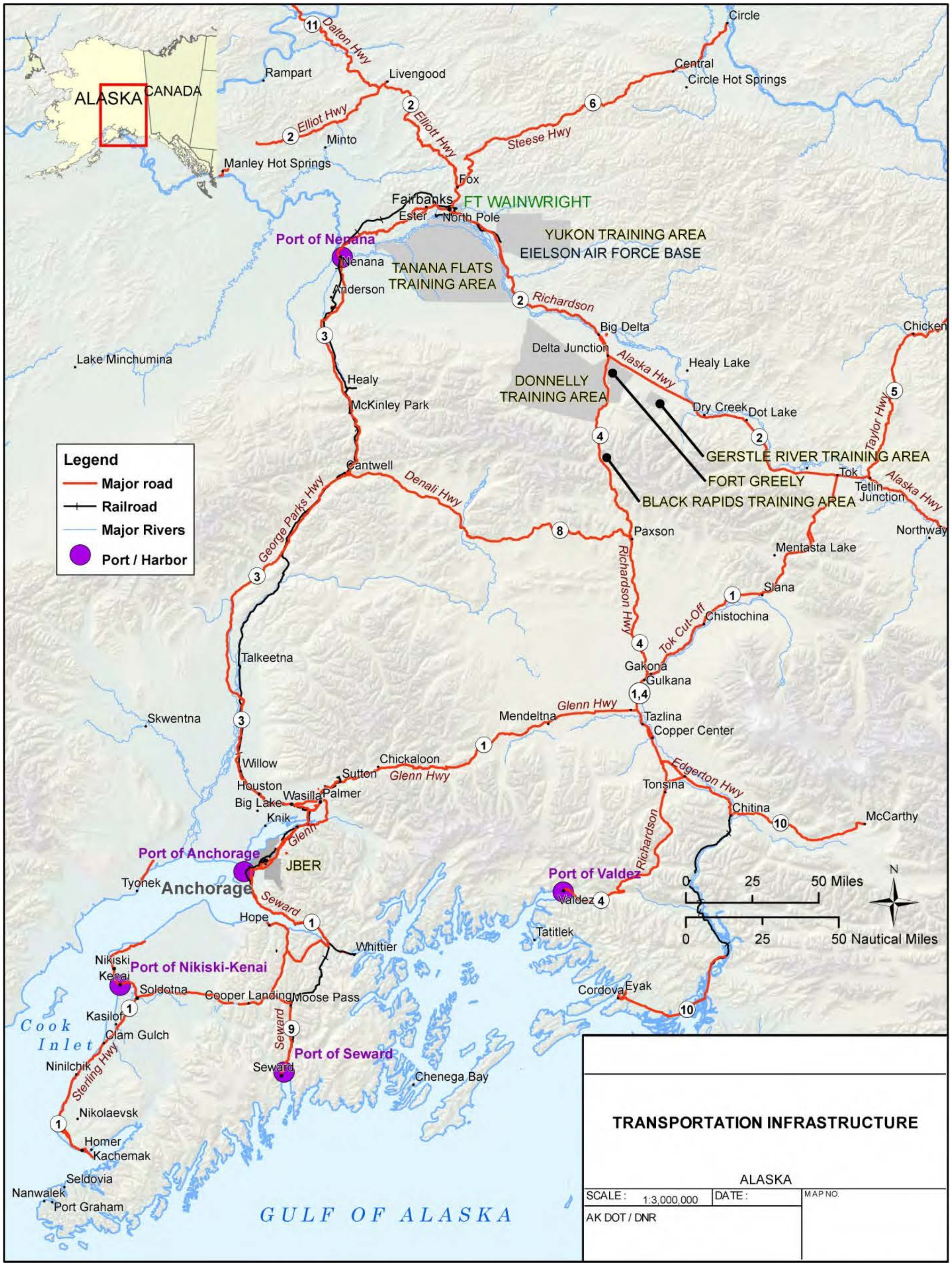

Figure B-25. Transportation Infrastructure

Table B–17. Surface Transportation: Interstate and State Highways

Highway Name - Segment Description	Interstate Designation	State Highway Designation	Lane Configuration	Pavement Type	Roadway Miles	Limitations	Weather Restrictions
Glenn Highway							
- Downtown Anchorage to Hiland Drive (Anchorage)	A-1	SH 1	6-Lane divided	Bituminous concrete	10		
- Hiland Drive (Anchorage) to Eagle River	A-1	SH 1	5-Lane divided	Bituminous concrete	1		
- Eagle River to Matanuska Junction	A-1	SH 1	4-Lane divided	Bituminous concrete	23		
- Matanuska Junction to Glennallen at Richardson Hwy	A-1	SH 1	2 - Lane undivided	Bituminous concrete	145		
- Gakona Junction to Tok at Alaska Highway (aka Glenn Highway/Tok Cutoff)	A-1	SH 1	2-Lane undivided	Bituminous concrete	122		
Richardson Highway							
- Airport Way (Fairbanks) to Mitchell Expressway Junction (Fairbanks)		SH 2	4-Lane divided	Bituminous concrete	1		
- Mitchell Expressway Junction (Fairbanks) to Eielson Air Force Base	A-2	SH 2	4-Lane divided	Bituminous concrete	20		
- Eielson Air Force Base to Delta Junction	A-2	SH 2	2-Lane undivided	Bituminous concrete	73		
- Delta Junction to Fort Greely		SH 4	2-Lane undivided	Bituminous concrete	4		
- Fort Greely to Gakona Junction		SH 4	2-Lane undivided	Bituminous concrete	133		
- Gakona Junction to Glennallen at Glenn Highway	A-1	SH 4	2-Lane undivided	Bituminous concrete	14		
- Glennallen at Glenn Highway to Valdez		SH 4	2-Lane undivided	Bituminous concrete	117		

Table B-17. Surface Transportation: Interstate and State Highways (*continued*)

Highway Name - Segment Description	Interstate Designation	State Highway Designation	Lane Configuration	Pavement Type	Roadway Miles	Limitations	Weather Restrictions
Alaska Highway							
- Delta Junction to Tok at Glenn Highway	A-2	SH 2	2-Lane undivided	Bituminous concrete	107		
- Tok at Glenn Highway to Canadian border - Airport Way (Fairbanks) to Mitchell Expressway Junction (Fairbanks)	A-2	SH 2 SH 2	2-Lane undivided 4-Lane divided	Bituminous concrete Bituminous concrete	90 1		
George Parks Highway							
- Matanuska Junction to Wasilla at Broadview Avenue	A-4	SH 3	4-Lane divided	Bituminous concrete	6		
- Wasilla at Broadview Avenue to Wasilla at Deskas Street	A-4	SH 3	5-Lane undivided	Bituminous concrete	4		
- Wasilla at Deskas Street to Denali Highway	A-4	SH 3	2- to 3-Lane undivided	Bituminous concrete	165		
- Denali Highway to Fairbanks East	A-4	SH 3	2- to 3-Lane undivided	Bituminous concrete	143		
- Fairbanks East to Airport Way (Fairbanks)	A-4	SH 3	4-Lane divided	Bituminous concrete	1		
Seward Highway							
- Downtown Anchorage to Fireweed (Anchorage)		SH 1	8-Lane divided/city street	Bituminous concrete	1.3		
- Fireweed (Anchorage) to Tudor Road (Anchorage)		SH 1	6-Lane divided	Bituminous concrete	1.2		
- Tudor Road (Anchorage) to Dowling Road (Anchorage)	A-3	SH 1	4-Lane divided	Bituminous concrete	1		
- Dowling Road (Anchorage) to Potter Hill	A-3	SH 1	4-Lane divided	Bituminous concrete	7		

Table B-17. Surface Transportation: Interstate and State Highways (*continued*)

Highway Name - Segment Description	Interstate Designation	State Highway Designation	Lane Configuration	Pavement Type	Roadway Miles	Limitations	Weather Restrictions
- Potter Hill to Sterling Highway Junction	A-3	SH 1	2- to 4-Lane undivided	Bituminous concrete	79		
- Sterling Highway Junction to Seward		SH 9	2- to 3-Lane undivided	Bituminous concrete	37		
Sterling Highway							
- SH9 Junction to Devin Drive (Soldotna)	A-3	SH 1	2- to 3-Lane undivided	Bituminous concrete	57		
- Devin Drive (Soldotna) to Kenai Spur Highway (Soldotna)	A-3	SH 1	5-Lane undivided	Bituminous concrete	0.2		
- Kenai Spur Highway (Soldotna) to Kalifornsky Beach Road (Soldotna)		SH 1	5-Lane undivided	Bituminous concrete	1.3		
- Kalifornsky Beach Road (Soldotna) to Lake Street (Homer)		SH 1	2- to 4-Lane undivided	Bituminous concrete	74		
Steese Highway							
- Airport Way (Fairbanks) to Winch Road (Fairbanks)		SH 2	4- to 5-Lane divided	Bituminous concrete	8		
- Winch Road (Fairbanks) to Fox		SH 2	2-Lane undivided	Bituminous concrete	3		
- Fox to Nome Creek Road		SH 6	2-Lane undivided	Bituminous concrete	44		
- Nome Creek Road to End of Bituminous Concrete Section		SH 6	2-Lane undivided	Bituminous concrete	5		Closed winters
- End of Bituminous Concrete Section to Circle		SH 6	2-Lane undivided	Graded aggregate	95		Closed winters
Elliot Highway							
- Fox to Livengood		SH 2	2-Lane undivided	Bituminous concrete	68		

Table B-17. Surface Transportation: Interstate and State Highways (*continued*)

Highway Name - Segment Description	Interstate Designation	State Highway Designation	Lane Configuration	Pavement Type	Roadway Miles	Limitations	Weather Restrictions
- Livengood to Eureka		SH 2	2-Lane undivided	Graded aggregate	57		
Dalton Highway (North Slope Haul Rd)							
- Livengood to Deadhorse		SH 2	2-Lane undivided	Bit. conc. and grad. aggr.	415		
Denali Highway							
- George Parks Highway (Cantwell) to Richardson Highway (Paxson)		SH 8	2-Lane undivided	Bit. conc. and grad. aggr.	134		Closed winters
Taylor Highway							
- Tetlin Junction to Chicken		SH 5	2-Lane undivided	Bituminous concrete	65		Closed winters
- Chicken to SH9 Junction		SH 5	2-Lane undivided	Graded aggregate	29		Closed winters
- SH9 Junction to Eagle		SH 5	2-Lane undivided	Graded aggregate	62		Closed sinters
Edgerton Highway							
- Pippin Lake to Chitina		SH 10	2-Lane undivided	Bituminous concrete	33		
Cooper River Highway							
- Cordova to miles Lake		SH 10	2 - Lane Un-Divided	Bit. Conc. and Grad. Aggr.	57		Closed winters
Top of the World Highway							
- SH5 Junction to Canadian border		SH 9	2 - Lane Un-Divided	Bit. Conc. and Grad. Aggr.	13		Closed winters

- ***State Highway 4***. SH4, also known as Richardson Highway, runs in a northerly direction from Valdez to Delta Junction. SH4 intersects Interstate A1 near Glennallen and is designated as Interstate A1 until just south of Gakona.
- ***State Highway 9***. SH9, also known as Seward Highway, runs in a northerly direction from Seward until it intersects Interstate A3/SH1 east of Cooper Landing.
- ***State Highway 11***. A continuation of SH2 out of Livengood, SH11 (also known as Dalton Highway) runs in a northerly direction to the town of Deadhorse at Prudhoe Bay.

Other Public Roads and Bridges. One current project is the proposed Tanana River Bridge project just north of Salcha. This crossing will replace the existing Tanana River winter land bridge. The Tanana River Crossing will provide a single-lane bridge for vehicular traffic in addition to the rail bridge. Phase 2 connects the river crossing bridge to the mainline, while the third phase provides access from the river crossing into DTA. The final phase will provide access from DTA into Delta Junction with a crossing over the Delta River.

Ice roads and bridges are important arteries of transportation in the winter months in Alaska. Typically these are constructed in areas where construction of solid surface roads is not practical due to landscape and soil limitations or the presence of bodies of water. In addition, off-road trails are an extremely important part of the transportation network in Alaska. These trails provide a link to more-remote and less-populated areas of Alaska and are heavily used by hunters, recreationalists, and local citizens for land access, subsistence, and other uses.

Rail Network. The first railroad in Alaska was constructed by the Alaska Central Railway in 1903. The initial track began in Seward and extended northward approximately 50 miles. In 1914, the U.S. Congress authorized construction and operation of a railroad from Seward to Fairbanks, and in 1923, the golden spike was driven at Nenana to mark completion of the project. The U.S. Government operated the rail system until it was purchased by the State of Alaska in 1985. The State of Alaska formed the Alaska Railroad Corporation (ARRC) and appointed a Board of Directors to operate the system as a self-sustaining corporation.

Today, the Alaska Railroad extends from Seward northward into Anchorage, and continues in a northerly direction to Fairbanks. From Fairbanks, the rail extends in a southeasterly direction to Eielson AFB. The rail system consists of 467 miles of main line and has another 189 miles of branch lines, yard rail, and sidings. The ARRC owns or leases 1,381 freight cars, 45 passenger cars and 51 locomotives. During 2010, the Alaska Railroad had a ridership of more than 405,000 and a freight tonnage in excess of 6.3 million tons (ARRC 2011).

Proposed Rail. The ARRC maintains a comprehensive inventory of capital improvement projects. The purpose of these projects varies from safety and efficiency enhancements to facility upgrades and expansion.

The recently approved Northern Rail Extension Project, shown in Figure B-24, would have the greatest impact on military operations. The project will extend the Alaska Railroad from the Chena River Overflow Structure near Eielson AFB to Delta Junction. The 80-mile extension project consists of four phases and is currently underway.

The first phase includes the Tanana River Crossing just north of Salcha. The Tanana River Crossing will provide a single-lane bridge for vehicular traffic in addition to the rail bridge. Phase 2 connects the river crossing bridge to the mainline, while the third phase provides access from the river crossing into DTA. The final phase will provide access from DTA into Delta Junction with a crossing over the Delta River.

B.12 SOCIOECONOMICS

B.12.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and regional industries. It may also include local and state tax revenues that are the basis for expenditures on public infrastructure and services. Changes to these fundamental socioeconomic components can influence other resources such as housing availability, utility capabilities, and community services.

The EIS study area includes all or portions of nine census-defined areas including four boroughs and five census areas and is defined as the ROI. In Alaska, boroughs are equivalent to counties. Census areas are also equivalent to counties; however, census areas denote a rural area that is not part of an organized borough. The actions described in Chapter 2 would involve expansion of MOAs, restricted airspace, SUA, and construction of facilities and intermediate staging bases (ISBs). Therefore, the following resources are addressed under socioeconomics as the indicators that could be impacted by these activities: demographics, housing, economic activity (employment and earnings), and key industries in the ROI.

B.12.2 Regulatory Setting

There are no specific regulations for managing or evaluating socioeconomic effects. However, social and economic sustainability is considered an important factor in Federal decisions. Not only does this topic cover aspects that can directly impact citizens in an affected area, but capacities of the social systems and the local economy are interwoven with the military mission and quality of life. Enhancing military capabilities can stimulate a local economy, but related activities may affect certain industries and qualities of an area that indirectly impact the economy.

Land owned by the Federal government is generally not subject to taxation by state or local governments. Under PL 94-565, enacted in 1976, the Federal Government began a program of making payments in lieu of taxation to local governments affected by this reduction in their tax bases.

B.12.3 General Description of Affected Environment

B.12.3.1 Population and Housing

The two largest population centers in the ROI, the Fairbanks North Star Borough (which includes the city of Fairbanks) and the Matanuska-Susitna Borough, had 2010 populations of about 97,581 and 88,995 persons, respectively (Table B–18). Combined, these areas represent approximately 80 percent of the total population in the ROI and 26.3 percent of the total population in Alaska. The fastest rate of population growth in the ROI between 2000 and 2010 occurred in the Matanuska-Susitna Borough (immediately north of Anchorage), with an average annual increase of 4.14 percent, this followed by the Fairbanks North Star Borough, with 1.65 percent (USCB 2011).

Based on 2010 census data, the Fairbanks North Star Borough is the most densely populated area in the ROI, with more than 13 persons per square mile, as compared with the rural areas such as the Denali Borough, the Lake and Peninsula Borough or the Yukon-Koyukuk Census Area, where population density is approximately 1 person per 10 square miles. The Matanuska–Susitna Borough (north of Anchorage) has a larger population and higher population density than other areas in the ROI mainly due to its proximity to Anchorage (USCB 2011).

Table B–18. Population and Housing Characteristics

Area	Population				Housing		
	2000	2010	Average Annual Percent Change	Population Density, 2010 (persons per square mile)	2000	2010	Average Annual Percent Change
Fairbanks North Star Borough	82,840	97,581	1.65	13.2	33,291	41,783	2.30
Valdez-Cordova Census Area	10,194	9,636	–0.56	0.3	5,148	6,102	1.71
Matanuska-Susitna Borough	59,323	88,995	4.14	3.6	27,329	41,329	4.23
Bethel Census Area	16,046	17,013	0.59	0.4	5,188	5,919	1.33
Dillingham Census Area	4,922	4,847	–0.15	0.3	2,332	2,427	0.40
Lake and Peninsula Borough	1,823	1,631	–1.11	0.1	1,557	1,502	–0.36
Denali Borough	1,893	1,826	–0.36	0.1	1,351	1,771	2.74
Southeast Fairbanks Census Area	6,174	7,029	1.31	0.3	3,225	3,915	1.96
Yukon-Koyukuk Census Area	6,510	5,588	–1.52	Z	3,917	4,038	0.30
State of Alaska	626,931	710,231	1.23	1.2	260,978	306,967	1.64

Key: Z=value greater than zero but less than half unit of measure shown.
Source: USCB 2011.

As the two largest population centers in the ROI, the Fairbanks North Star Borough and the Matanuska-Susitna Borough are also large housing centers. In 2010, the total number of housing units in the Fairbanks North Star Borough totaled 41,783 units, while the total number of housing units in the Matanuska-Susitna Borough was estimated at 41,329 units (USCB 2011). Both of these areas have experienced rather strong growth in the number of housing units, with housing increasing in the Matanuska-Susitna Borough at an average annual rate of 4.23 percent and 2.3 percent in the Fairbanks North Star Borough between 2000 and 2010 (USCB 2011). The only area in the ROI to experience a decline in the total number of housing units was the Lake and Peninsula Borough, which experienced an average annual percent decrease of 0.36 percent (USCB 2011).

B.12.3.2 Economic Activity

The economy in the State of Alaska is largely dependent on natural resources, particularly oil and gas production, though tourism and the military are also major contributors. The Fairbanks North Star Borough, which includes the city of Fairbanks, is one of the largest economic and employment centers. Residents of the rural areas of Alaska focus on extraction of natural resources and subsistence resources. Subsistence resources, characteristic of Alaska, are discussed in a following section.

Government and government enterprises provide many jobs in the cities and in the rural regions and provide a measure of stability through year-round employment. Seasonal employment that includes commercial fishing, guided hunting, and related industries is also an important source of income. Resource-based tourism, mining, and oil/gas extraction and production also contribute to regional economic activity.

The regional economy in remote rural areas of Alaska depends on the people, the way of life, the local government structure, and the Alaska Native corporations (Goldsmith 2008). Standard economic measures do not typically capture subsistence, sharing, and non-cash trading activities, which are important components of rural economies in Alaska. Thus, collecting data for these regions is often difficult and costly (Goldsmith 2008). However, on average, the rural areas included in the planning

areas have lower levels of employment (and higher levels of unemployment). This is due to several reasons including: the government directly accounts for most personal income; jobs available in remote areas often do not match the local labor supply; many workers are non-locals; and many households depend on jobs and subsistence activities (Goldsmith 2008).

Unemployment typically refers to any person that is aged 16 and older, that has not been employed for one week, is physically capable of working, and is actively looking for employment. As reflected in Table B–19, rural regions that have the highest unemployment rates include the Yukon-Koyukuk Census Area, with 15.4 percent, and the Bethel Census Area, with 15.0 percent. In contrast, the highly populated Fairbanks North Star Borough had the lowest unemployment rate of the areas in the ROI during 2010 (BLS 2011). Unemployment and employment figures, particularly for rural regions in Alaska, provide estimates, and might not fully capture the number of jobs held by self-employed people that are mostly seasonal, and often part-time, that do not appear in the state's official employment figures (Goldsmith 2008). The three areas in the ROI with the lowest population density were also the only areas in the ROI to experience a negative average annual percent change in employment between 2001 and 2009.

The Denali Borough had the highest per capita personal income in 2009 of the areas in the ROI. The Valdez-Cordova Census Area and the Southeast Fairbanks Census Area also had a high per capita personal income in 2009 (Table B–19). The Southeast Fairbanks Census Area experienced the largest average annual percent change with 7.0 percent between 2001 and 2009 (BEA 2010).

B.12.3.3 Key Industries in the EIS Study Area

Energy Production. The drilling and extraction of oil and natural gas contribute a large portion to the economic activity of Alaska. Alaska is the second-ranked oil producing state in the United States behind Texas. The oil and gas industry is the largest source of state revenue and provides some of the highest paying jobs in the state. Oil and gas activities are primarily confined to the northernmost portion of Alaska in the North Slope Borough or along the Cook Inlet south of Anchorage, predominantly outside the Fairbanks ROI.

Due to the size, population, and geography of Alaska, renewable energy will play a key role in supplying the state's growing demand for electricity, heat, and transportation fuel. Hydroelectric power is Alaska's largest source of renewable energy and provides almost a quarter of the state's electrical energy. The majority of the state's developed hydroelectric resources are located near communities in Southcentral, the Alaska Peninsula, and Southeast. Major communities that are supplied with hydropower include Kodiak, Valdez, Cordova, and Glennallen (AEA 2009).

Exploration of geothermal sources is increasing statewide, while other various energy sources, including wind, ocean and wave energy and solar energy, are also becoming more attractive. There is high potential for geothermal and wind energy in the Fairbanks area. Wind energy potential is outstanding along the south coast and south and southeast of DTA under the Fox MOA. However, the equipment used for capturing wind energy interferes with electromagnetic signatures and causes localized wind vortexes, both of which are incompatible with military operations (particularly air operations).

Mining. The minerals industry is a cornerstone of Alaska's economy. Major communities such as Fairbanks were founded on the mining industry, which includes exploration, mine development, and mineral production (RDC 2011a). In 2009, the mineral production value in the state totaled $2.5 billion, while exploration and development expenditures totaled $180 million and $330.8 million, respectively. Statewide, the industry provided approximately 3,280 full-time jobs with an estimated payroll of $320 million (ADOC 2009). The largest producing mines within the ROI include the Pogo gold mine

near Delta Junction, the Fort Knox gold mine and Livengood Project near Fairbanks, and the Usibelli coal mine near Healy (ADOC 2009).

Recreation and Tourism. Outdoor recreation, including hunting, fishing, boating, hiking, camping, and observing wildlife, occurs on Federal, state, and private land, and contributes largely to the local communities. Businesses such as hunting and fishing guides, lodges, air taxis, and other tourist related services benefit from recreational activities. More details regarding recreational areas are provided in Section B.10.2.3, Recreation.

Table B–19. Employment, Unemployment, and Income Characteristics

Area	Employment			Unemployment Rate, 2010 (percent)	Per Capita Income		
	2001	2009	Average Annual Percent Change		2001 (dollars)	2009 (dollars)	Average Annual Percent Change
Fairbanks North Star Borough	52,639	58,761	1.4	7.1	28,481	38,895	4.0
Valdez-Cordova Census Area	7,081	7,235	0.3	8.7	32,038	45,177	4.4
Matanuska-Susitna Borough	23,268	31,896	4.0	9.1	28,428	38,508	3.9
Bethel Census Area	8,122	8,629	0.8	15.0	21,676	29,173	3.8
Dillingham Census Area	3,923	4,128	0.6	10.1	27,341	35,828	3.4
Lake and Peninsula Borough	959	847	–1.5	8.1	25,277	36,694	4.8
Denali Borough	2,181	2,099	–0.5	9.3	40,697	54,097	3.6
Southeast Fairbanks Census Area	2,473	3,777	5.4	10.6	24,786	42,508	7.0
Yukon-Koyukuk Census Area	3,302	3,014	–1.1	15.4	21,494	32,135	5.2
State of Alaska	401,252	445,663	1.3	8.0	32,271	43,212	3.7

Source: BEA 2010; BLS 2011.

Nonresident travel to Alaska occurs year-round, however, the majority of visitors come to Alaska during the "summer" season between May 1 and September 30. The Alaska Visitors Statistics Program estimated 1.58 million out-of-state visitors to Alaska between May and September 2009, a decline of 7.3 percent from the previous year (McDowell Group 2010). The majority of visitors came to Alaska by cruise ship or air, while less-popular modes of transportation included highway or ferry. During the 2008–2009 visitor season, Alaska's visitor industry accounted for a total of 36,200 full- and part-time jobs, $1.1 billion in labor, $3.4 billion in total spending, and $208.6 million in taxes and revenues to municipal and state governments (including direct, indirect, and induced impacts). The most popular tourist destination area was the Southcentral region, followed by the Southeast region and the Interior (McDowell Group 2010).

Fishing. Alaska constitutes one of the most bountiful fishing regions in the world, with more than 3 million lakes, 3,000 rivers, and 34,000 miles of coastline on three different seas (RDC 2011b). There are four types of fishing available in Alaska: sport, subsistence, personal use, or commercial. Commercial fisheries are an integral part of many communities and local economies in the state. The total wholesale value of commercial fisheries is more than $3 billion. The combined economic impact of

commercial and sport fishing is $7.4 billion and support of 89,915 full-time-equivalent jobs (ADFG 2011). Regulations governing fishing depend on the type of fishing and the location.

Civilian Aviation. In 2007, the aviation industry was estimated to contribute $3.5 billion to the state's economy. In addition, estimates suggest that the industry provides more than 27,000 on-site jobs and 20,000 off-site jobs in the state, the majority around international airports such as Anchorage and Fairbanks (Northern Economics, Inc. 2009). Civilian aviation represents a category of flying that includes private and commercial aviation activities but not military aviation activities. Civilian aviation in Alaska contributes significantly to the state's economy and is heavily relied upon for travel, safety, firefighting, recreation, hunting, mining, oil and gas development, and supplies. There are numerous open public airports and airfields located within the ROI. More information regarding the airports and airfields within the ROI is provided in Section B.1, Airspace Management.

B.13 SUBSISTENCE RESOURCES

B.13.1 Definition of Resource

Subsistence plays a vital role in the lifestyles of Alaska residents, particularly rural residents and the Alaska Native culture, and is a unique characteristic of life in Alaska. *Subsistence Management Regulations for Public Lands in Alaska* (36 CFR 242) defines subsistence as the "customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." In the rural regions of Alaska, services and products are not always accessible, and subsistence fishing and hunting are important to supplement employment and nutrition in these regions. Approximately 50 percent of the food for three-quarters of the Alaska Native families in the state's smaller communities is acquired through subsistence activities. Other important uses of subsistence products are as follows:

- Clothing, including the use of wild furs and hides for ruffs, mitts, parkas, clothes lining, and winter boots.
- Fuel, specifically wood, a major source of heat for rural homes that do not have access to centralized utilities. Wood is also used for smoking and preserving fish or meat.
- Food (fish, seals, and other products) for dog teams that are used as transportation.
- Construction materials, specifically spruce, birch, hemlock, willow, and cottonwood, used for house logs, sleds, and fish racks, among other items.
- Hides, often used as sleeping mats; seal skins, to store food; and wild grasses, made into baskets and mats.
- Specialized products for barter and exchange between communities in traditional trade networks. Furs are sold to outside markets to provide an important source of income for rural communities. Ivory, grass, wood, skins, and furs are also crafted into items for use and sale in outside markets.
- For Alaska Natives, traditional ceremonies such as funerals, potlatches, marriages, and native dances.

Under state regulations, subsistence is open to all Alaska residents on state or private land, but under Federal regulations, subsistence is limited to rural residents on Federally owned lands. Due to the disparity between Federal and state subsistence regulations, the jurisdiction for managing subsistence has been divided between the Federal Subsistence Board and the State of Alaska. Under Federal regulations, all communities and areas in Alaska are considered rural, with the exception of major towns and cities

and their surrounding areas. Access to subsistence resources using a preference system is tied to the permit system for hunting and take limits.

B.13.2 Regulatory Setting

In 1978, the State of Alaska passed legislation regulating subsistence and applying subsistence to rural residents. Additional state legislation was passed in 1989 extending subsistence to all residents. In 1980, Congress passed ANILCA, a priority subsistence law for Federal lands in Alaska. Federal and state law defines subsistence as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. Under these laws and related regulations, Alaska residents are given priority in harvesting game and nongame resources for personal use over individuals harvesting game and nongame resources for sport or commercial reasons.

ANILCA obligates Federal agencies to manage their lands to support customary and traditional subsistence activities on Federal land, with preference for rural Alaskans' desire to harvest fish and wildlife on Federal lands, particularly when resources (i.e., species traditionally harvested for subsistence) are scarce (16 U.S.C. 314).

B.13.3 General Description of Affected Environment

The affected environment for subsistence resources is defined as the areas in which subsistence resources, including subsistence wildlife and vegetation, are present and accessible. Additional areas identified as traditional use areas for Alaska Natives are also included.

Subsistence users tend to harvest in traditional use areas accessible to their communities and for particular resources. These harvest areas are defined, for each individual community, based on their historic use and the availability of wildlife in the area. Due to the large size of the planning area, it would not be feasible to delineate every traditional use area for each community. In general, traditional subsistence areas are closely related to the major habitats or migration routes of the most common subsistence species (moose, caribou, Dall sheep, and fish). These habitats and migration routes are discussed in more detail in Section B.8.3. Communities participating in subsistence, traditional subsistence areas in the vicinity of the existing Air Force and Army installations and ranges or SUA, and species typically harvested by the communities for subsistence are reflected in Table B–20. Since a component of subsistence resources is related to cultural and ceremonial practices of Alaska Natives, Table B–20 also provides the population characteristics and identifies communities where Federally-recognized tribes are traditionally located. As ANILCA obligates Federal agencies to manage their lands in support of subsistence activities, there are identified areas on military installations in which subsistence activities are permitted. JBER, Fort Wainwright, Fort Greely, TFTA, YTA, and DTA have such designated areas, and species are available to the public for subsistence harvesting in accordance with defined access procedures. More detail on these areas and the access procedures are provided in Section 3.13 in Chapter 3 of the EIS.

Table B–20. Community Subsistence Characteristics in the Study Area

Village	Population (2010)	Location	Alaska Native Population Percentage	Federally-Recognized Tribe Located in Community	Primary Subsistence Species/Activity
Aleknagik	219	Dillingham Census Area	84.6	Yes	Salmon, freshwater fish, moose, caribou, berries, trapping
Anderson	246	Denali Borough	6.5	No	N/A
Aniak	501	Bethel Census Area	73.3	Yes	Salmon, moose, bear, birds, berries, gardening
Anvik	85	Yukon-Koyukuk Census Area	90.4	Yes	Salmon, moose, black bear, small game, trapping, handicrafts, gardening
Beaver	84	Yukon-Koyukuk Census Area	95.2	Yes	Moose, salmon, freshwater fish, bear, waterfowl, gardening, berries
Big Delta	591	Southeast Fairbanks Census Area	2.1	No	N/A
Birch Creek	33	Yukon-Koyukuk Census Area	100.0	Yes	Salmon, whitefish, moose, black bear, waterfowl, berries
Central	96	Yukon-Koyukuk Census Area	9.7	No	N/A
Chickaloon	272	Matanuska-Susitna Borough	6.3	Yes	Salmon, non-salmon, black bear, moose, caribou, Dall sheep, squirrel, porcupine
Chicken	7	Southeast Fairbanks Census Area	0.0	No	N/A
Chistochina	93	Valdez-Cordova Census Area	63.4	Yes	Hunting, fishing, trapping, gathering
Chuathbaluk	118	Bethel Census Area	94.1	Yes	Salmon, moose, black bear, porcupine, waterfowl, fur garments
Circle	104	Yukon-Koyukuk Census Area	85.0	Yes	Salmon, freshwater fish, moose, bear, trapping, handicrafts
Copper Center/Kluti Kaah	328	Valdez-Cordova Census Area	50.6	Yes	Hunting, fishing, trapping, gathering
Crooked Creek	105	Bethel Census Area	93.4	Yes	Salmon, moose, caribou, waterfowl, trapping
Delta Junction	958	Southeast Fairbanks Census Area	5.6	No	Moose, caribou, bear, sheep, waterfowl, trapping
Dillingham	2,329	Dillingham Census Area	60.9	Yes	Salmon, grayling, pike, moose, bear, caribou, berries, trapping
Dot Lake	13	Southeast Fairbanks Census Area	5.3	No	N/A

Table B-20. Community Subsistence Characteristics in the Study Area (*continued*)

Village	Population (2010)	Location	Alaska Native Population Percentage	Federally-Recognized Tribe Located in Community	Primary Subsistence Species/Activity
Dot Lake Village	62	Southeast Fairbanks Census Area	73.7	Yes	Moose, duck, geese, ptarmigan, porcupines, caribou, whitefish, other freshwater fish
Ekuk/Clarks Point	62	Dillingham Census Area	92.0	Yes	Salmon, smelt, moose, bear, rabbit, ptarmigan, duck, geese, trade for whitefish and ling cod
Ekwok	115	Dillingham Census Area	93.8	Yes	Salmon, pike, moose, caribou, duck, berries, gardening
Ferry	33	Denali Borough	0.0	No	N/A
Fort Yukon	583	Yukon-Koyukuk Census Area	88.7	Yes	Salmon, whitefish, moose, bear, caribou, waterfowl, trapping, handicrafts
Fox	417	Fairbanks-North Star Borough	9.7	No	N/A
Gakona	218	Valdez-Cordova Census Area	17.7	Yes	N/A
Galena	470	Yukon-Koyukuk Census Area	67.4	Yes	N/A
Glennallen	483	Valdez-Cordova Census Area	12.1	No	N/A
Grayling	194	Yukon-Koyukuk Census Area	91.8	Yes	Salmon, moose, black bear, small game, waterfowl, trapping, gathering, gardening
Gulkana	119	Valdez-Cordova Census Area	73.9	Yes	Hunting, fishing, trapping, gathering
Healy	1,021	Denali Borough	5.3	No	N/A
Healy Lake	13	Southeast Fairbanks Census Area	73.0	Yes	N/A
Holy Cross	178	Yukon-Koyukuk Census Area	96.5	Yes	Hunting, fishing, trapping, gardening
Huslia	275	Yukon-Koyukuk Census Area	95.2	Yes	Salmon, whitefish, moose, bear, caribou, waterfowl, berries
Igiugig	50	Lake and Peninsula Borough	83.0	Yes	Salmon, trout, whitefish, moose, caribou, rabbit
Iliamna	109	Lake and Peninsula Borough	57.8	Yes	Salmon, trout, grayling, moose, caribou, bear, seal, porcupine, rabbit
Kokhanok	170	Lake and Peninsula Borough	90.8	Yes	Salmon, trout, grayling, moose, bear, rabbit, porcupine, seal

Table B–20. Community Subsistence Characteristics in the Study Area (*continued*)

Village	Population (2010)	Location	Alaska Native Population Percentage	Federally-Recognized Tribe Located in Community	Primary Subsistence Species/Activity
Koliganek	209	Dillingham Census Area	87.4	Yes	N/A
Lake Minchumina	13	Yukon-Koyukuk Census Area	12.5	No	N/A
Lime Village	29	Bethel Census Area	0.0	Yes	Salmon, moose, bear, caribou, waterfowl, berries
Manley Hot Springs	89	Yukon-Koyukuk Census Area	23.6	Yes	Salmon, moose, fishing, gardening
Manokotak	442	Dillingham Census Area	94.7	Yes	Salmon, herring, sea lion, beluga whale, trout, ptarmigan, duck, berries
McGrath	346	Yukon-Koyukuk Census Area	54.6	Yes	Salmon, moose, caribou, bear, rabbit, trapping, gardening
McKinley Park	185	Denali Borough	3.5	No	N/A
Mentasta Lake	112	Valdez-Cordova Census Area	71.1	Yes	Hunting, fishing, trapping
Minto	210	Yukon-Koyukuk Census Area	92.2	Yes	Salmon, whitefish, moose, bear, small game, waterfowl, berries, handicrafts, furs
Naknek	544	Bristol Bay Borough	47.1	Yes	N/A
Nenana	378	Yukon-Koyukuk Census Area	47.3	Yes	Salmon, moose, caribou, bear, waterfowl, berries
Newhalen	190	Lake and Peninsula Borough	91.3	Yes	Salmon, trout, grayling, moose, caribou, rabbit, porcupine, seal
New Stuyahok	510	Dillingham Census Area	96.0	Yes	Salmon, moose, caribou, rabbit, ptarmigan, duck, geese
Nikolai	94	Yukon-Koyukuk Census Area	81.0	Yes	Salmon, moose, caribou, rabbits, bear, trapping, handicrafts
Nondalton	164	Lake and Peninsula Borough	90.0	Yes	Salmon, trout, grayling, moose, caribou, bear, Dall sheep, rabbit, porcupine
Northway	71	Southeast Fairbanks Census Area	82.1	No	N/A
Northway Village	98	Southeast Fairbanks Census Area	77.6	Yes	Birds and eggs, including migratory birds
Paxson	40	Valdez-Cordova Census Area	0.0	No	N/A

Table B-20. Community Subsistence Characteristics in the Study Area (*continued*)

Village	Population (2010)	Location	Alaska Native Population Percentage	Federally-Recognized Tribe Located in Community	Primary Subsistence Species/Activity
Port Alsworth	159	Lake and Peninsula Borough	22.1	No	N/A
Rampart	24	Yukon-Koyukuk Census Area	91.1	Yes	Salmon, whitefish, moose, caribou, waterfowl, small game, gardening, berries
Red Devil	23	Bethel Census Area	52.1	Yes	Salmon, bear, moose, caribou, rabbit, waterfowl, berries
Ruby	166	Yukon-Koyukuk Census Area	86.2	Yes	Salmon, whitefish, moose, bear, ptarmigan, waterfowl, berries
Shageluk	83	Yukon-Koyukuk Census Area	96.9	Yes	Salmon, moose, bear, small game, waterfowl, trapping, gardening
Skwentna	37	Matanuska-Susitna Borough	7.2	No	N/A
Slana	147	Valdez-Cordova Census Area	15.3	No	N/A
Sleetmute	86	Bethel Census Area	89.0	Yes	Salmon, moose, bear, porcupine, rabbit, waterfowl, berries
Stony River	54	Bethel Census Area	85.2	Yes	Salmon, moose, caribou, bear, porcupine, waterfowl, berries
Takotna	52	Yukon-Koyukuk Census Area	42.0	Yes	Moose, salmon, gardening
Tanacross	136	Southeast Fairbanks Census Area	90.0	Yes	Whitefish, moose, porcupine, rabbit, ptarmigan, duck, geese, caribou, salmon, trapping, handicrafts
Tazlina	297	Valdez-Cordova Census Area	30.2	Yes	Fishing and hunting
Telida	3	Yukon-Koyukuk Census Area	100.0	Yes	N/A
Tetlin	127	Southeast Fairbanks Census Area	97.4	Yes	Whitefish, moose, duck, geese, spruce hens, rabbit, berries, roots
Tok	1,258	Southeast Fairbanks Census Area	19.0	No	Moose, bear, rabbit, grouse, ptarmigan, Dall sheep, caribou, salmon, berries, gardening
Tyonek	171	Kenai Peninsula Borough	95.3	Yes	Salmon, moose, beluga whale, waterfowl, trapping

Key: N/A=Information on species is not available.
Source: ADOC 2010.

B.14 ENVIRONMENTAL JUSTICE

B.14.1 Definition of Resource

Analysis of environmental justice considers whether impacts of an action are unequally borne by a particular segment of the affected population, specifically, persons who belong to an ethnic or racial minority, low-income persons, or children. For the purpose of the environmental justice analysis, these populations are defined as follows:

> **Minority Populations:** All persons identified by the U.S. Census Bureau to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, or members of some other (i.e., non-white) race or two or more races.
>
> **Low-Income Populations:** All persons who fall within the statistical poverty thresholds established by the U. S. Census Bureau. For the purposes of this analysis, low-income populations are defined as persons living below the poverty level. The percentage of low-income persons is calculated as the percentage of all persons for whom the Census Bureau determines poverty status, which is generally a different number than the total population because it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years of age. Starting with the 2010 decennial census, poverty data will be provided through the annual American Community Survey rather than as part of the decennial census.
>
> **Children:** All persons identified by the Census to be under the age of 18 years.

B.14.2 Regulatory Setting

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of Federal agencies on how their actions affect the human health and environmental conditions to which minority and low-income populations are exposed. This EO was also established to ensure that, if there were disproportionately high and adverse human health or environmental effects of Federal actions on these populations, those effects would be identified and addressed. The environmental justice analysis addresses the characteristics of race, ethnicity, and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*), was issued to identify and address anticipated health or safety issues that affect children. The protection-of-children analysis addresses the distribution of population by age in areas potentially affected by implementation of the proposed action.

Regulations governing Native land claims, conservation lands, and subsistence activities, such as ANCSA and ANILCA are addressed in Section B.10, Land Use, and Section B.13, Subsistence Resources.

B.14.3 General Description of Affected Environment

As with socioeconomic resources, environmental justice analysis identifies nine census-defined areas, including four boroughs and five census areas, within the broad study area. Boroughs and census areas in Alaska are equivalent to counties in other states.

Alaska Natives live on many lands in the planning area. In Alaska Native villages, the Native lifestyle is based on, or supplemented by, subsistence activities. Section B.13, Subsistence Resources, provides a list

of Federally recognized Alaska Native villages and the subsistence activities available in the vicinity of each village.

Based on data from the 2005–2009 American Community Survey, the incidence of persons in the study area with incomes below the poverty level generally exceeds state levels, particularly in the rural areas and areas with high minority and Alaska Native populations. Poverty rates in the study area over that 5-year period ranged from a low of 6.1 percent in the Denali Borough to a high of 24.1 percent in the Yukon-Koyukuk Census Area, as compared with the state's poverty rate of 9.6 percent (USCB 2010) (see Table B–21; Figure B-26).

Minority persons represent between 11.6 and 89.1 percent of each locale's total population. Alaska Natives are the largest minority group, constituting over 80 percent of the total population in some locales. By comparison, minority persons represent 35.9 percent of the state's total population, with Alaska Natives constituting only 14.8 percent (USCB 2011) (see Table B–21 and Figure B-27).

Children make up between 22.5 and 36.5 percent of each locale's population, as compared with 26.4 percent of the state's total population (Table B–21).

The levels of minorities (including Alaska Natives) and low-income persons living in the rural areas of Alaska is noteworthy, because noise levels in low-altitude military training airspace may be incompatible with residential life and aspects of subsistence practices. Avoidance of populated areas by minimum vertical and lateral distances is a method used to alleviate some degree of noise intrusion.

Table B–21. Minority Population, Low-Income Population and Children by Area

Area	Total Population	Percent Low-Income	Percent Minority	Percent Alaska Native	Percent Children
Fairbanks North Star Borough	97,581	8.0	25.9	7.0	25.6
Valdez-Cordova Census Area	9,636	8.1	27.9	13.6	24.4
Matanuska-Susitna Borough	88,995	10.3	17.2	5.5	28.9
Bethel Census Area	17,013	18.2	89.1	82.9	36.5
Dillingham Census Area	4,847	18.3	82.4	71.6	32.9
Lake and Peninsula Borough	1,631	22.1	77.8	65.1	30.2
Denali Borough	1,826	6.1	11.6	3.6	22.5
Southeast Fairbanks Census Area	7,029	11.6	21.3	11.5	26.3
Yukon-Koyukuk Census Area	5,588	24.1	78.2	71.4	27.8
State of Alaska	710,231	9.6	35.9	14.8	26.4

Note: Except for percent low-income, which is derived from the 2005–2009 American Community Survey, numbers represent 2010 census data.
Source: USCB 2010, 2011.

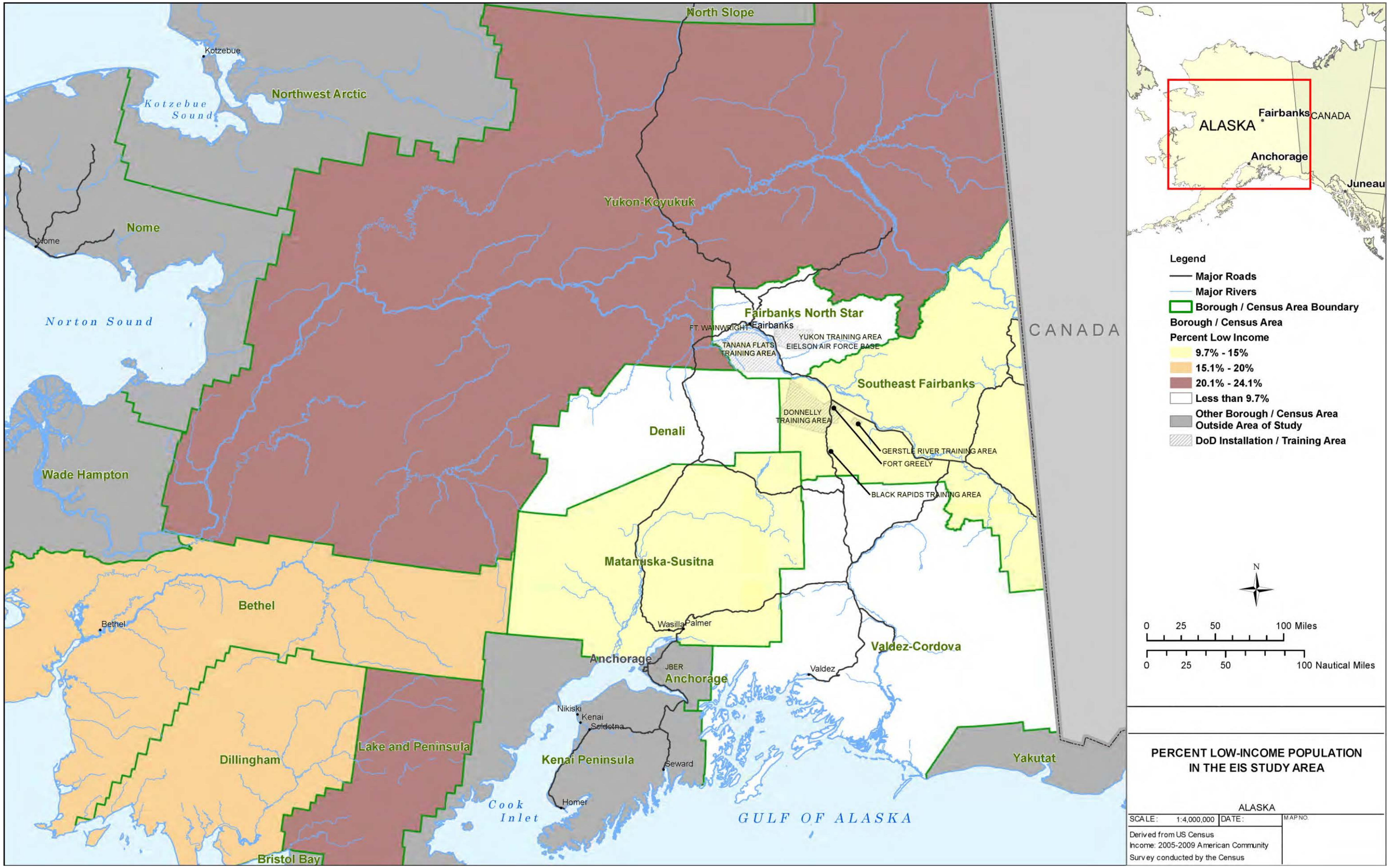

Figure B-26. Percent Low-Income Population in EIS Study Area

Figure B-27. Percent Minority Population in Central Alaska

B.15 REFERENCES (APPENDIX B)

ADEC (Alaska Department of Environmental Conservation). 2003. 18 Alaska Administrative Code 62 – Hazardous Waste. As amended through 8 August.

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Appendix C
Conflict of Interest Statements

APPENDIX C
CONFLICT OF INTEREST STATEMENTS

NEPA DISCLOSURE STATEMENT FOR THE JOINT PACIFIC ALASKA RANGE COMPLEX (JPARC) ENVIRONMENTAL IMPACT STATEMENT

The Council on Environmental Quality (CEQ) Regulations at Title 40 of the *Code of Federal Regulations* (CFR) Section 1506.5(c), which have been adopted by the U.S. Air Force (32 CFR 989), require contractors and subcontractors who will prepare an environmental impact statement to execute a disclosure specifying that they have no financial or other interest in the outcome of the project.

"Financial or other interest in the outcome of the project" is defined as any direct financial benefit such as a promise of future construction or design work in the project, as well as indirect financial benefits the contractor is aware of.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows, to the best of their actual knowledge as of the date set forth below:

(a) X Offeror and any proposed subcontractors have no financial or other interest in the outcome of the project.

(b) __ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract, or agree to the attached plan to mitigate, neutralize or avoid any such conflict of interest.

Financial or Other Interests:

None

Certified by: Diane L. Keep

Signature

DIANE L. KEEP
Name

CONTRACTS MANAGER
Title

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
Company

27 January 2012
Date

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Appendix D
Airspace Management

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ACRONYMS AND ABBREVIATIONS

AGL	above ground level
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
CFA	Controlled Firing Area
CFR	Code of Federal Regulations
EIS	environmental impact statement
FAA	Federal Aviation Administration
ft	feet
FL	flight level
IFR	Instrument Flight Rules
JPARC	Joint Pacific Alaska Range Complex
LATN	Low-Altitude Tactical Navigation
MTR	Military Training Route
MOA	Military Operations Area
MSL	mean sea level
NM	nautical miles
RNAV	Area Navigation
Spb	Seaplane Base
SUA	Special Use Airspace
VFR	Visual Flight Rules

APPENDIX D
AIRSPACE MANAGEMENT

D.1 DEFINITION OF RESOURCE

The National Airspace System (NAS) is designed and managed by the Federal Aviation Administration (FAA) in a manner that strives to meet both the individual and common needs of all military, commercial, and general aviation interests. In general, all navigable airspace is categorized as either regulatory or nonregulatory. Regulatory consists of the Class A-E airspace areas, restricted areas, and prohibited areas while nonregulatory includes Military Operations Areas (MOAs), warning areas, alert areas, and controlled firing areas, all of which are described below. Within those two categories are four types of airspace: "controlled," "special use," "uncontrolled," and "other." Airspace is further defined in terms of classifications according to the operating and flight rules that apply to each airspace area. The manner in which airspace is classified depends on (1) the complexity or density of aircraft operations within an airspace area, (2) the nature of those operations, (3) the level of safety required, and (4) national and public interest. Airspace management discussions reference these types/classifications, where appropriate, as they relate to the JPARC proposal regions of influence (FAA 2008).

Table D-1 provides basic definitions of the more-common aeronautical terms used throughout the airspace management sections.

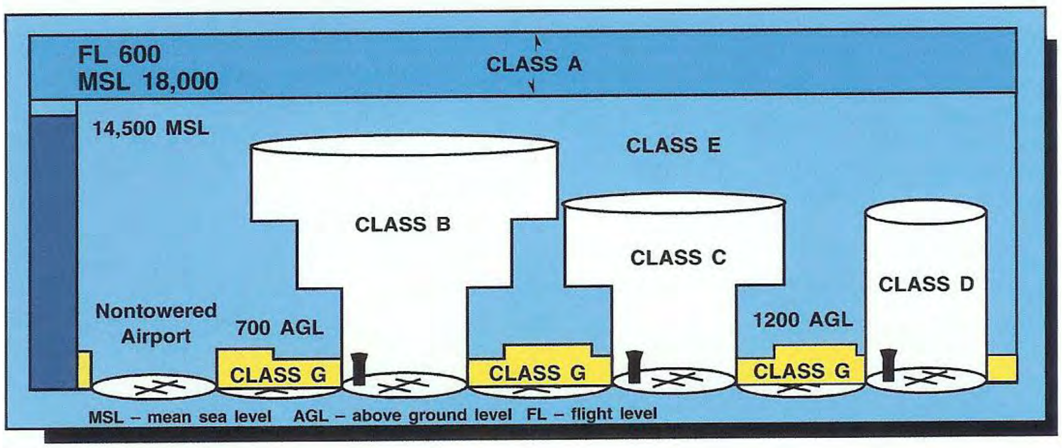
Table D-1. Aviation and Airspace Use Terminology

Term	Definition
Visual flight rules (VFR)	A standard set of rules that all pilots, both civilian and military, must follow when not operating under IFR and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.
Instrument flight rules (IFR)	A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than VFR. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by FAA regulations, and operating in some locations such as major civilian airports. ATC agencies ensure separation of all aircraft operating under IFR.
Above ground level (AGL)	Altitude expressed in feet measured above the ground surface.
Mean sea level (MSL)	Altitude expressed in feet measured above average (mean) sea level.
Flight level (FL)	Manner in which altitudes at 18,000 feet MSL and above is expressed, as measured by a standard altimeter setting of 29.92. For instance, 20,000 feet MSL is expressed as FL200.
Sortie/sortie-operation	*Sortie* refers to an operational mission conducted by a single aircraft. *Sortie-operation* refers to a flight activity conducted by that single aircraft within a designated airspace area during the sortie mission. Airspace use tracking typically accounts for an aircraft sortie-operation within each area it operates throughout the course of the overall training mission.

Key: AGL=above ground level; ATC=air traffic control; FAA=Federal Aviation Administration; FL=flight level; MSL=mean sea level.
Source: FAA 2008.

Controlled airspace is airspace of defined dimensions within which Air Traffic Control (ATC) services are provided to instrument flight rule (IFR) and visual flight rule (VFR) flights in

accordance with the airspace classification (FAA 2011). Controlled airspace is categorized into five separate classes: Classes A through E. These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place to place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace class. Military aircrews fly under FAA rules when not conducting flight activities within special use airspace (SUA). Uncontrolled airspace (designated as Class G) has no specific prohibitions associated with its use. Figure D-1 illustrates the different types of airspace designations.



Source: FAA 2008.

Figure D-1. Airspace Designations

Definitions for various designations are provided below.

Class A airspace, generally, is that airspace from 18,000 feet above mean sea level (MSL) up to, and including, Flight Level (FL) 600. Unless otherwise authorized, all aircraft must operate IFR within Class A airspace.

Class B airspace, generally, is that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The actual configuration of Class B airspace is individually tailored and consists of a surface area and two or more layers and is designed to contain all published instrument procedures (FAA 2008).

Class C is generally that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a radius of 5 nautical miles (NM) and an outer circle with a 10-NM radius that extends from 1,200 to 4,000 feet above the airport elevation (FAA 2008).

Class D airspace, generally, is that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored, and when instrument procedures are published, the airspace will normally be designed to contain those procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (FAA 2008).

Class E airspace is controlled airspace that is not Class A, B, C, or D. The floor of Class E airspace is generally 700 feet above ground level (AGL). There are areas where Class E airspace begins at either the surface or 700 feet AGL that are used to transition to/from the terminal or en route environment (around airports without control towers). These areas are designated by VFR sectional charts. In most areas of the United States, Class E airspace extends from 1,200 feet AGL up to, but not including, 18,000 feet MSL, the lower limit of Class A airspace. No ATC clearance or radio communication is required for VFR flight in Class E airspace. VFR visibility requirements below 10,000 feet MSL are 3 statute miles visibility and cloud clearance of 500 feet below, 1,000 feet above, and 2,000 feet horizontal. Above 10,000 feet MSL the requirement is 5 statute miles visibility and cloud clearance of 1,000 feet below, 1,000 feet above, and 1 mile laterally (FAA 2008). There are seven types of Class E airspace:

Surface area designated for an airport. When so designated, this type of Class E airspace will be configured to contain all instrument procedures.

Extension to a surface area. These are Class E airspace areas that serve as extensions to Class B, C, and D surface areas designated for an airport. This airspace provides controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.

Airspace used for transition. These are Class E airspace areas, beginning at either 700 or 1,200 feet AGL, used to transition to/from the terminal or en route environment.

En route domestic airspace areas. These areas are Class E airspace areas that extend upward from a specified altitude to provide controlled airspace where there is a requirement for IFR en route air traffic control services, but where the Federal Airways System is inadequate.

Federal airways. Federal airways (Victor airways) are Class E airspace areas, and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL.

Other. Unless designated at lower altitudes, Class E airspace begins at 14,500 feet MSL to, but not including, 18,000 feet MSL overlying: the 48 contiguous including the waters within 12 miles from the coast of the 48 contiguous states; the District of Columbia; Alaska (including the waters within 12 miles from the coast of Alaska and that airspace above FL600) and excluding the Alaska peninsula west of longitude 160°00'00" west and the airspace below 1,500 feet above the surface of the earth unless specifically so designated.

Offshore/control airspace areas. This includes airspace areas beyond 12 NM from the coast of the United States wherein air traffic control services are provided (FAA 2011).

Airspace that has not been designated as Class A, B, C, D, or E airspace is "uncontrolled airspace" (Class G). Class G airspace generally underlies Class E airspace with vertical limits up to 700 feet AGL, 1,200 feet AGL, or 14,500 feet AGL, whichever applies. Cloud clearance and visibility requirements differ by altitude and day versus night.

The FAA has charted and published SUA for military and other governmental activities. SUA is designated airspace within which flight activities are confined to participating aircraft or specific

operating limitations are placed on nonparticipating aircraft. Military operations areas (MOAs), restricted areas, controlled firing areas (CFAs), and warning areas are examples of SUA. Other airspace consists of advisory areas, areas that have specific flight limitations or designated prohibitions, areas designated for parachute jump operations, military training routes (MTRs), low-altitude tactical navigation (LATN) areas, and aerial refueling tracks. This category also includes air traffic control assigned airspace (ATCAA).

Management of SUA involves how airspace is designated, used, and administered to best accommodate the individual and common needs of commercial aviation, general aviation, the military, resource management agencies, and others. The FAA considers multiple and sometimes competing demands for aviation airspace in relation to airport operations, Federal airways, jet routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to accommodate all user requirements. Airspace currently used for military training activities in Alaska includes the following types:

Military Operations Areas. A MOA is SUA of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain nonhazardous military activities (i.e., no weapons use) from IFR traffic and to identify where these activities are conducted for VFR traffic (FAA 2011). Because MOAs are considered “joint use” airspace, nonparticipating aircraft operating under VFR are permitted to enter a MOA even when that MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA provided clearance through this airspace by the responsible ATC facility. If an IFR aircraft is approved for transit through a MOA, then military training is suspended in the affected portion of the MOA during the period of transit.

Air Traffic Control Assigned Airspaces. An ATCAA is airspace of defined vertical and lateral limits assigned by ATC for the purpose of segregating ongoing airspace activities from other IFR air traffic (FAA 2011). When not required for other needs, an ATCAA is authorized for military use by the managing Air Route Traffic Control Center (ARTCC). ATCAAs, which are in Class A airspace, are frequently structured and used to extend the horizontal and/or vertical boundaries of MOAs. ATCAAs can extend from FL180 to FL600 or higher.

Restricted Areas. Restricted areas are designated airspaces that support ground or flight activities that could be hazardous to nonparticipating aircraft. A restricted area is designated under Title 14 of the Code of Federal Regulations (CFR), Part 73 (14 CFR 73), within which the flight of aircraft is subject to restriction. Most restricted areas are designated “joint-use,” and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency (FAA 2011).

Military Training Routes. MTRs are flight corridors developed and used by the U.S. Department of Defense (DoD) to practice high-speed, low-altitude flight, generally below 10,000 feet MSL. Specifically, MTRs are airspace of defined vertical and lateral dimensions established for the conduct of military flight training in excess of 250 knots indicated airspeed (KIAS).

Warning Areas. A warning area is airspace of defined dimensions, extending from 3 NM outward from the coast of the United States that features aerial activity that may be

hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

Controlled Firing Areas. A CFA is established for live-fire activities that, if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft.

Low-Altitude Tactical Navigation Areas. LATN areas are airspace outside a MOA used for low-altitude training by aircraft such as the A-10 *Warthog* and C-130 *Hercules*, which can safely operate at speeds of 250-knots (287 mph) or less. At such speeds, these aircraft are capable of safely merging with general aviation traffic. Military aircraft engaged in this type of exercise, like all other aircraft, are required to comply with Federal aviation regulations concerning the visibility and avoidance of other aircraft and obstacles. FAA and Air Force regulations also require aircraft utilizing the LATN area to avoid airfields, towns, noise-sensitive areas, and wilderness areas by prescribed vertical and/or horizontal distances.

Figure D-2 depicts all existing Federal airways, jet routes, Area Navigation (RNAV) routes, and SUA within the general region of influence for the proposed JPARC airspace actions. This figure also includes the LATN area and MTRs for Chapter 3 references to these two training airspace types that are not included in the JPARC proposals.

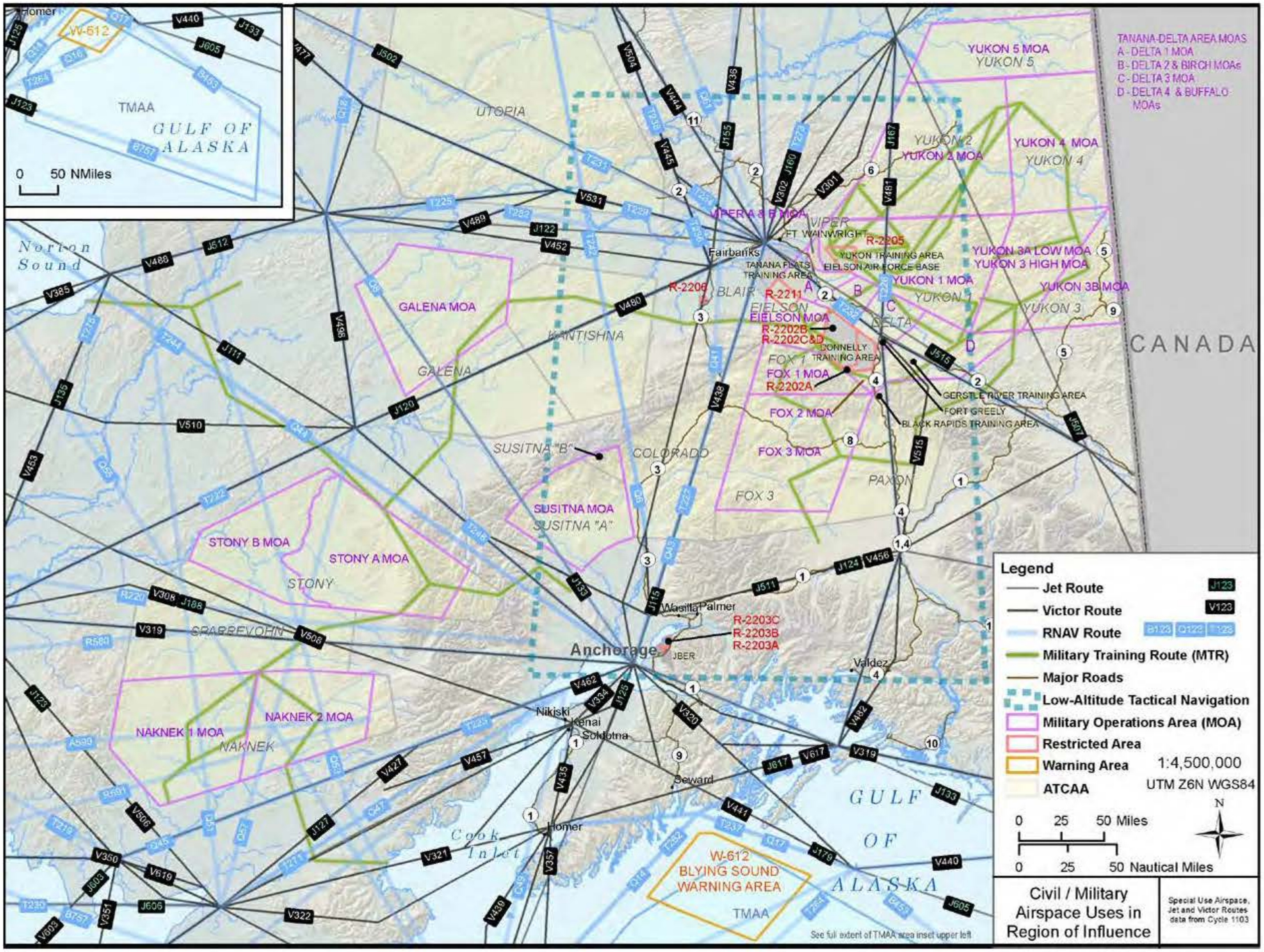


Figure D-2. Civil/Military Airspace in Region of Influence

D.2 MILITARY TRAINING AIRSPACE USES

Table D-2 and Table D-4 include the representative annual sorties-operations for all Alaska MOAs and restricted areas and Military Training Routes most frequently used by all Air Force, Army, and allied forces for routine and Major Flying Exercises. Table D-3 shows the portion of a training mission that is typically flown by the individual aircraft types within the different altitude blocks shown in this table. These altitudes are generally representative of most mission flight activities within SUA although fighter aircraft would conduct a greater portion of their sorties at lower altitudes within restricted airspace while performing air-to-ground maneuvers.

Table D-2. Description and Representative Annual Use of Alaska Training Airspace

Airspace Designation	Altitudes	Total Annual Sorties[1]	Total Annual Days Use[2]	Using/Controlling Agency[1]
Birch MOA	500 ft AGL – 5,000 ft MSL	4,708	58	Air Force 354th FW
Blair ATCAA	FL180 – FL600	6,233	58	Air Force 354th FW
Buffalo MOA	300 ft AGL up to, not including 7,000 ft MSL	4,711	58	Air Force 354th FW
Delta ATCAA	FL180 – FL600	6,330	58	Air Force 354th FW
Delta MOAs	Floors 3,000 ft AGL – 10,000 ft MSL, extending up to, not including FL180	5,429	52	Air Force 354th FW
Eielson MOA/ ATCAA	100 ft AGL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	10,603	220	Air Force 354th FW
Fox 1/2 MOA/ ATCAA	5,000/7,000 ft AGL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	10,525	220	Air Force 354th FW
Fox 3 MOA/ ATCAA	5,000 ft AGL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	9,877	211	Air Force 354th FW
Paxon ATCAA	FL180 – FL600	6,982	211	Air Force 354th FW
Viper A MOA	500 ft AGL up to, not including 10,000′ MSL	0	0	Air Force 354th FW Fairbanks ATCT
Viper B MOA/ ATCAA	10,000 ft MSL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	8,034	163	Air Force 354th FW
Yukon 1 MOA/ ATCAA	100 ft AGL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	8,034	163	Air Force 354th FW
Yukon 2 MOA/ ATCAA	100 ft AGL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	7,076	104	Air Force 354th FW
Yukon 3A Low/ 3 MOAs/ATCAAs	100/300 ft AGL up to, not including 7,000 ft MSL	6,274	52	Air Force 354th FW

Table D-2. Description and Representative Annual Use of Alaska Training Airspace *(continued)*

Airspace Designation	Altitudes	Total Annual Sorties[1]	Total Annual Days Use[2]	Using/Controlling Agency[1]
Yukon 3 Hi MOA	10,000 ft MSL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	6,270	52	Air Force 354th FW
Yukon 3B MOA	2,000 ft AGL up to, not including FL180	6,106	44	Air Force 354th FW
Yukon 4 MOA/ ATCAA	100 ft AGL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	6,286	56	Air Force 354th FW
Yukon 5 MOA/ ATCAA	5,000 ft MSL up to, not including FL180; maximum altitude FL600 (when ATCAA activated)	6,106	44	Air Force 354th FW
Stony A/B	100/2,000 ft AGL up to, not including FL180	2,499	212	Air Force 3rd Wing
R-2202 A/B	Surface up to, not including, 10,000 ft MSL	6,290	241	USARAK, Cold Regions Test Center
R-2202 C	10,000 ft MSL – FL600	6,290	241	USARAK, Cold Regions Test Center
R-2202 D	Above FL600 to unlimited	6,290	241	USARAK, Cold Regions Test Center
R-2205	Surface to 20,000 ft MSL	5,510	215	USARAK, JBER/ Fairbanks ATCT
R-2211	Surface to FL600	2,386	170	Air Force 354th FW Fairbanks ARTC

[1] FAA Controlling air traffic control agency is Anchorage Air Route Traffic Control Center unless otherwise indicated.

Key: AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; ARTC = Air Route Traffic Control; ATCT = Air Traffic Control Tower; FL = flight level;:ft = feet; FW = Fighter Wing; JBER = Joint Base Elmendorf-Richardson; MOA = Military Operations Area; MSL = mean sea level; USARAK = U.S. Army Alaska

Source: Air Force 2010a, 2010b.

Table D-3. Typical Altitude Use by Representative Aircraft Types

Aircraft Type	Altitude Distribution (Percentage of Sortie Duration by Altitude)					
	500–1,000	1,000 – 3,000	3,000 – 5,000	5,000 – 10,000	10,000 – FL180	FL180 and above
A-10	33	17	16	24	10	0
F-15C	0	2	3	10	25	60
F-15E	5	5	5	10	25	50
F-16A	4	2	3	5	26	60
F-18A	5	2	3	12	28	50
F-22A	5	2	3	5	10	75
F-35B	4	2	3	5	26	60
Foreign Fighters	5	2	3	12	28	50
EA-6B	0	0	0	0	20	80
Rotary Wing Aircraft	20	27	28	25	0	0
B-1B	2	5	5	3	20	65
B-2	0	0	0	0	3	97
B-52	0	1	1	3	5	90
C-130	28	15	15	22	20	–
C-17	10	12	13	30	23	12
KC-135	0	0	0	0	20	80
KC-10	0	0	0	0	0	100
E-2	0	0	0	0	0	100
E-3	0	0	0	0	0	100

Table D-4. Description and Representative Annual Use of JPARC MTRs

MTR	Altitudes		Annual Sorties	Scheduling/Using Agency
	Min	Max		
IR-900 IR-916 VR-1900 VR-1916	100 AGL	10,800 ft above MSL 1,500 ft AGL	0 0 39 0	Air Force 354th FW
IR-909 IR-939 VR-1909 VR-1939	100 AGL	10,600 ft above MSL 1,500 ft AGL	0 0 0 0	Air Force 354th FW
IR-952 IR-953 VR-954 VR-955	100 AGL	17,000 ft above MSL 9,500 ft above MSL	0 0 10 0	Air Force 354th FW
IR-922 IR-923 VR-940 VR-941	100 AGL	16,200 ft above MSL	0 0 96 1,440	Air Force 354th FW
IR-919 IR-921 VR-937 VR-938	100 AGL	14,700 ft above MSL	87 15 1,428 96	Air Force 354th FW
IR-917 IR-918 VR-935 VR-936	100 AGL	10,600 ft above MSL 9,500 ft above MSL	0 0 0 10	Air Force 354th FW
IR-903 IR-913 VR-933 VR-934	100 AGL	12,000 ft above MSL	4 1 1 1	Air Force 3rd Wing
IR-902 IR-912 VR-1902 VR-1912	100 AGL	7,000 ft above MSL 1,500 ft AGL	2 1 1 1	Air Force 3rd Wing
IR-905 IR-915 VR-1905 VR-1915	100 AGL	13,700 ft above MSL 1,500 ft AGL	52 1 1 1	Air Force 3rd Wing
IR-901 IR-911 VR-931 VR-932	100 AGL	7,200 ft above MSL 6,500 ft above MSL	2 1 1 1	Air Force 3rd Wing

Key: AGL=above ground level; ft = feet; R=Instrument Route; MSL=mean sea level; MTR.=Military Training Route; VR=Visual Route.
Source: Air Force 2009.

D.3 PUBLIC AIRPORTS AND PRIVATE AIRFIELDS

Table D-5 and Figure D-3 identify and depict the charted public airports and private airfields that are located within 30 nautical miles of the inclusive JPARC proposed airspace.

Table D-5. Charted Public Airports and Private Airfields Located within 30 Nautical Miles of the JPARC Proposed Airspace

Public	Private	Name	FAA ID	Based Aircraft	Annual Operations	Year of Operations	Map Index
	X	All West Airport	AK77	–	–		C–2
	X	Anderson Lake Airport	0AK1	–	–		A–5
	X	Arctic Angel Airport	9AK4	–	–		C–2
	X	Bald Mountain Airport	2AK7	–	–		A–4
X		Beaver Lake Seaplane Base	D71	6	430	2009	A–5
X		Big Lake Airport	BGQ	11	20,000	2009	A–5
X		Birch Creek	Z91	–	–		A–4
X		Birchwood Airport	BCV	–	–		A–5
X		Black Rapids Airport	5BK	–	110	2005	C–3
X		Bold Airport	A13	–	–		A–5
X		Bradley Sky-Ranch Airport	9Z	76	9,855	2006	B–1
X		Brocker Lake Seaplane Base	6A7	1	–		A–5
X		Butte Municipal Airport	AK1	–	–		A–5
X		Cantwell Airport	TTW	–	–		A–3
	X	Carl's Landing	AK19	–	–		A–4
	X	Chena Hot Springs Airport	AK13	–	–		C–1
X		Chena River Seaplane Base	2Z5	–	–		B–1
X		Chistochina Airport	CZO	2	1,600	2005	D–4
X		Christiansen Lake Seaplane Base	AK8	12	–		A–4
X		Clear Airport	Z84	–	–		A–2
X		Clear Sky Lodge Airport	CLF	–	–		A–2
X		Clearwater Airport	Z86	–	–		B–3
X		Copper Center 2 Airport	Z93	12	225	2009	C–4
X		Cottonwood Lake Seaplane Base	3H3	–	180	1975	A–5
	X	Crosswind Lake Airport	1AK2	–	–		C–4
	X	Dalrymple's Airport	31AK	–	–		B–1
	X	Delta Daves Airport	AA22	16	–		C–2
X		Delta Junction Airport	D66	–	–		C–2
	X	Denali Airport	AK06	–	–		A–3
	X	Duffy's Tavern Airport	DDT	–	–		D–3
X		Eva Creek Airport	2Z3				A–2
X		Fairbanks International Airport	FAI	382	133,267	2010	B–1
	X	Farrars Airport	28AK				B–4
X		Finger Lake Seaplane Base	99Z	10	25	2005	A–5
X		Gold King Creek Airport	AK7	1	50	2005	B–2
	X	Golden North Airfield Airport	15AK	–	–		A–3
X		Goose Bay Airport	Z40	–	–		A–5
	X	Greg'n Sage Airport	AK41				B–2
X		Gulkana Airport	GKN	13	5,122	2006	C–4
	X	Hardrock Field Airport	32AK	–	–		B–1
X		Healy River Airport	HRR	–	–		A–2
	X	Hilltop Airport	AK24	–	–		A–5
	X	Hunter Creek Airport	AK66	–	–		A–5
X		Jones Landing Seaplane Base	L95	–	–		A–5
X		Jonesville Mine Airport (Closed)	JVM	0	0		A–5
	X	Kashwitna Lake Seaplane Base	AK34	–	–		A–4
	X	King Ranch Airport	AK59	–	–		B–4

Table D-5. Charted Public Airports and Private Airfields Located within 30 Nautical Miles of the JPARC Proposed Airspace *(continued)*

Public	Private	Name	FAA ID	Based Aircraft	Annual Operations	Year of Operations	Map Index
X		Lake Louise Airport (Closed)	Z55	0	0		C–4
X		Lake Louise Seaplane Base	13S	–	–		C–4
	X	Lakewood Airport	78AA	–	–		B–1
	X	Long Lake Airport	AK69	–	–		A–4
	X	Mankomen Lake Airport	4AK5	–	–		D–3
X		McKinley National Park Airport	INR	–	–		A–2
	X	Metro Field Airport	MTF	–	–		B–1
	X	Moen's Ranch Airport	AK52	–	–		B–1
	X	Montana Creek Airport	21AK	3	150	2005	A–4
X		Nancy Lake Seaplane Base	78Z	–	–		A–5
X		Nenana Municipal Airport	ENN	112	28,670	2007	A–2
	X	Newman Creek Airstrip	N/A	–	–		B–2
X		Palmer Municipal Airport	PAQ	–	–		A–5
X		Paxson Airport	PXK	–	–		C–3
	X	Pogo Mine Airstrip Airport	76AK	0	70	2005	C–2
	X	Remington Field Airport	26AK	–	–		C–2
X		Road Commission Nr 1 Airport	0Z2	–	–		B–3
	X	Rocking T Ranch Airport	11AK	–	–		C–2
	X	Rustic Wilderness Airport	02AK	–	–		A–4
	X	Scotts Airport	0AK0	14	2,200	2009	B–2
	X	Secluded Lake Airport	49AK	–	115	2009	A–4
X		Seymour Lake Seaplane Base (Spb)	3A3	–	–		A–5
X		Sheep Mountain Airport	SMU	–	–		B–4
	X	Shirley Lake Airport	AK90	–	–		A–4
	X	Sky Ranch At Pioneer Peak Airport	AK50	–	–		A–5
	X	Skyflight Airport	25AA	25	30,000	2009	B–1
X		Summit Airport	UMM	–	–		A–3
X		Talkeetna Airport	TKA	–	–		A–4
	X	Talkeetna Village Strip Airport	AK44	1	400	2005	A–4
X		Tanacross Airport	TSG	1	200	2010	D–3
X		Tazlina /Smokey Lake/ Seaplane Base	5AK	–	–		C–4
X		Tazlina Airport	Z14	38	2,700	2005	C–4
	X	Tok 2 Airport	8AK9	2	300	2005	D–3
X		Tok Junction Airport	6K8	–	–		D–3
X		Tolsona Lake Seaplane Base	58A	15	–		C–4
X		Totatlanika River Airport	9AK	–	–		B–2
X		Upper Wasilla Lake Seaplane Base	3K9	–	–		A–5
	X	Victory Airport	0AK6	87	–		B–4
X		Visnaw Lake Seaplane Base	T66	2	–		A–5
X		Wasilla Airport	IYS	–	–		A–5
	X	Wasilla Creek Airpark Airport	05AK	2	–		A–5
X		Wasilla Lake Seaplane Base	5L6	–	–		A–5
X		Willow Airport	UUO	–	–		A–4
	X	Wingsong Estates Airport	AK09	–	–		C–2
	X	Wolf Lake Airport	4AK6	–	–		A–5
	X	Wood River Lodge Airstrip	N/A	–	–		B–2

Key: FAA=Federal Aviation Administration.
Source: AirNav 2011; FAA 2008.

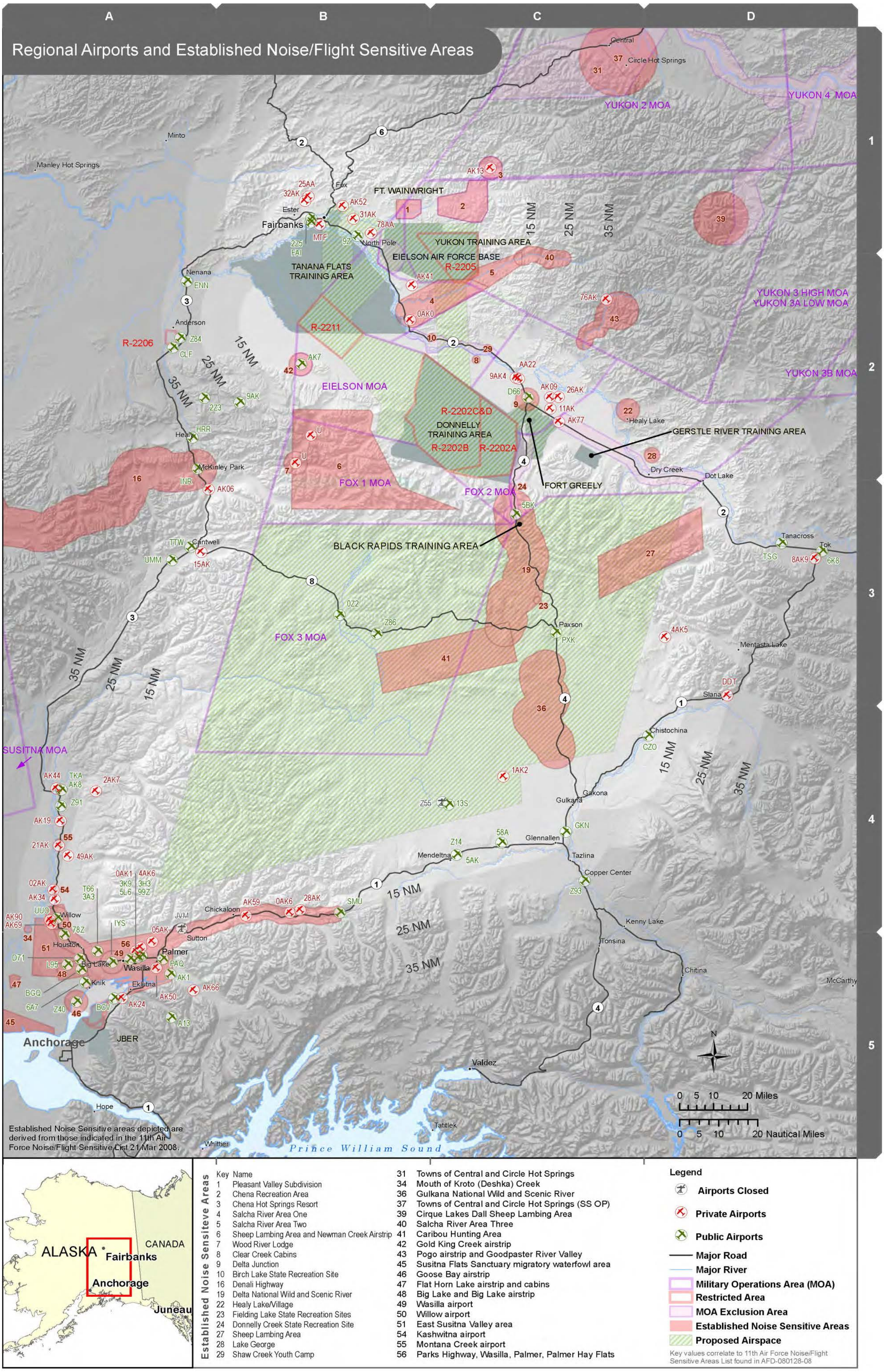


Figure D-3. Regional Airports and Established Noise Sensitive Areas

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D.4 FLIGHT AVOIDANCE AREAS

Table D-6 lists the many different flight avoidance areas that have been established by the Air Force to avoid those communities, airfields, and other sensitive areas where low-level aircraft flights and their noise levels may be a potential impact to those areas. These areas are depicted in Figure D-3. These avoidance areas were established both as a result of the Record of Decision for the *1997 Alaska Military Operations Area FEIS* and other Air Force initiatives to address public concerns over the aircraft intrusion and noise effects on these sensitive areas. Because of the dynamic nature of these flight noise/flight avoidance areas, an up-to-date listing is maintained in the 11th Air Force *Airspace Handbook*, which serves as the authority for identifying such areas.

Table D-6. Flight Avoidance Areas

#	Name	Altitude	Time(s) of Year
1	Pleasant Valley Subdivision (exclusion and adjustment to *Yukon 1*)	No flight below 6,000 ft above MSL. Flight at altitudes above 6,000 ft above MSL is restricted to nonmaneuvering, nonafterburning, navigational flight only.	Continuous
2	Chena Recreation Area (exclusion to *Yukon 1*)	Below 1,500 ft AGL	May 1 to Sep 30
3	Chena Hot Springs Resort (exclusion to *Yukon 2*)	Below 1,500 ft AGL	Continuous
4	Salcha River Area One (outside of MOAs)	Below 1,500 ft AGL	Continuous
5	Salcha River Area Two (adjustment to *Yukon 1*)	Below 1,000 ft AGL	May 1 to Aug 31
		Below 5,000 ft above MSL	Sep 1 to Sep 20
6	Sheep Lambing Area and Newman Creek Airstrip (adjustment to *Eielson* and below the floor of *Fox 1*)	Below 5,000 ft AGL	May 15 to Jun 15 Nov 15 to Dec 15
7	Wood River Lodge (below the floor of *Fox 1*)	Below 1,500 ft AGL	Continuous
8	Clear Creek Cabins (adjustment to *Birch*)	Below 1,500 ft AGL	Continuous
9	Delta Junction (outside of MOAs)	Below 1,500 ft AGL	Continuous
10	Birch Lake State Recreation Site (adjustment to *Birch*)	Below 2,000 ft AGL	May 15 to Sep 30
11	Harding Lake	Incorporated into *Salcha River Area One* (#4)	
12	Hog Farm	Removed Spring 08	
13	Ryan Lodge	Removed Spring 08	
14	Parks Highway (outside of MOAs)	Incorporated into *Parks Highway, Wasilla, Palmer, Palmer Hay Flats Bird Sanctuary, and Glenn Highway* (#56)	
15	Glenn Highway (outside of MOAs)	Incorporated into *Parks Highway, Wasilla, Palmer, Palmer Hay Flats Bird Sanctuary, and Glenn Highway* (#56)	
16	Denali Highway (outside of MOAs)	Below 2,000 ft AGL	May 15 to Sep 15
17	Yukon MOAs Peregrine Falcon Areas (exclusion and adjustment to *Yukon's 1, 2, 3A Low, 3B, 4*)	Moved to DOPAA listing	
18	Fox Farm	Ceased to exist	
19	Delta National Wild and Scenic River (Adjustment to *Buffalo and* below the floor of *Fox 2 and 3* and outside these MOAs)	Below 5,000 ft above MSL	Jun 27 to Jul 11
20	Mulchatna River Fishing Lodge (below the floor of *Naknek 2*)	Below 1,500 ft AGL	May 1 to Sep 30
21	Town of Nulato (outside of MOAs)	Below 1,000 ft AGL	Continuous
22	Healy Lake/Village (adjustment to *Buffalo*)	Below 6,000 ft above MSL	Continuous
23	Fielding Lake State Recreation Sites (outside of MOAs)	Below 2,000 ft AGL	May 15 to Sep 30
24	Donnelly Creek State Recreation Site (adjustment to *Buffalo*)	Below 2,000 ft AGL	May 15 to Sep 30
25	Summit Lake Lodge	Burned	

Table D-6. Flight Avoidance Areas *(continued)*

#	Name	Altitude	Time(s) of Year
26	Caribou Calving Area (below the floor of *Fox 3* and outside of MOAs)	Removed (summer of 2003)	
27	Sheep Lambing Area (outside of MOAs)	Below 1,000 ft AGL	May 1 to Jun 30
28	Lake George (adjustment to *Buffalo*)	Below 1,500 ft AGL	Continuous
29	Shaw Creek Youth Camp (adjustment to *Birch*)	Below 1,500 ft AGL	Continuous
30	Town of Circle City (adjustment to *Yukon 2*)	Below 6,000 ft above MSL	Continuous
31	Towns of Central and Circle Hot Springs (adjustment to *Yukon 2*)	Below 10,000 ft above MSL	Continuous
32	Mouth of Alexander Creek (outside of MOAs)	Below 1,500 ft AGL	May 1 to Oct 1
33	Mouth of Lake Creek (outside of MOAs)	Below 1,500 ft AGL	May 1 to Oct 1
34	Mouth of Kroto (Deshka) Creek (outside of MOAs)	Below 1,500 ft AGL	May 1 to Oct 1
35	Neil Lake	Removed Spring 08	
36	Gulkana National Wild and Scenic River (outside of MOAs)	Below 5,000 ft above MSL	Jun 27 to Jul 11
37	Towns of Central and Circle Hot Springs (Supersonic operations) (adjustment to *Yukon 2*)	Altitude: Below 30,000 ft above MSL	Continuous
38	Hunting areas in Yukon MOA	Replaced by *Salcha River Area One* (#4), *Salcha River Area Two* (#5), and *Salcha River Area Three* (#40)	
39	Cirque Lakes Dall Sheep Lambing Area (adjustment to *Yukon 1*)	Below 5,000 ft AGL	May 10 to Jun 15
40	Salcha River Area Three (adjustment to *Yukon 1*)	Below 5,000 ft above MSL for turbojet/turbofan aircraft Below 1,000 ft AGL for all other aircraft	Sep 1 to Sep 20
41	Caribou Hunting Area (below the floor of *Fox 3*)	Below 1,000 ft AGL	Aug 1 to Sep 30
42	Gold King Creek airstrip (exclusion to *Eielson*)	Below 1,500 ft AGL	Continuous
43	Pogo airstrip and Goodpaster River Valley (adjustment to *Yukon 1*)	500 ft AGL	Continuous
44	Nowitna National Wild River (adjustment to *Galena*)	Below 2,000 ft AGL	May 15 to July 15
45	Susitna Flats Sanctuary migratory waterfowl area (outside of MOAs)	Below 1,000 ft AGL	Apr 15 to May 31 Sep 1 to Oct 31
46	Goose Bay airstrip (outside of MOAs)	Below 1,500 ft AGL	Continuous
47	Flat Horn Lake airstrip and cabins (outside of MOAs)	Below 1,000 ft AGL	Continuous
48	Big Lake and Big Lake airstrip (outside of MOAs)	Below 1,500 ft AGL	Continuous
49	Wasilla airport (known locally as "New Wasilla", outside of MOAs)	Below 1,500 ft AGL	Continuous
50	Willow airport (outside of MOAs)	Below 1,500 ft AGL	Continuous
51	East Susitna Valley area (outside of MOAs)	Below 1,000 ft AGL	May 1 to Oct 31
52	Alexander Lake airstrip (outside of MOAs)	Below 1,500 ft AGL	Continuous
53	Kahiltna River cabins and airstrip (outside of MOAs)	Below 1,500 ft AGL	May 1 to Oct 1
54	Kashwitna airport (outside of MOAs)	Below 1,500 ft AGL	Continuous
55	Montana Creek airport (outside of MOAs)	Below 1,500 ft AGL	Continuous
56	Parks Highway, Wasilla, Palmer, Palmer Hay Flats Bird Sanctuary, and Glenn Highway (outside of MOAs)	Below 1,000 ft AGL	Continuous

Key: AGL = above ground level; ft = feet; MOA = Military Operations Area

The Special Use Airspace brochure follows.

I AM NOT A PILOT. WHY SHOULD I KNOW ABOUT MOAs AND SUAIS?

The information in this pamphlet is for all persons traveling in the vicinity of Military Operations Areas (MOAs) in Alaska. For persons on the ground, this pamphlet provides information on where low flying military aircraft and "jet noise" may occur.

SUAIS INFORMATION

For current information on MOA activity and range status, contact:

EIELSON RANGE CONTROL
VHF 125.3
1-800-758-8723
(907) 372-6913

To file a **NOISE COMPLAINT** call the
24 HOUR FEEDBACK LINE
1-800-538-6647
1-800-JET-NOISE

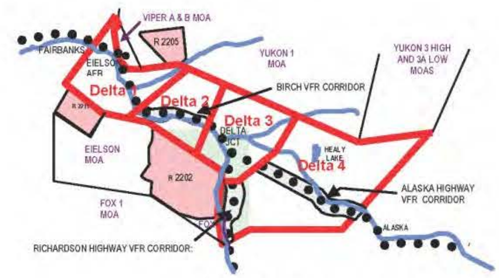
GENERAL SAFETY REPORTING

Report unexpected encounters with military aircraft or other safety concerns
JBER - (907) 552-4128/4798
Eielson - (907) 377-1155/1025

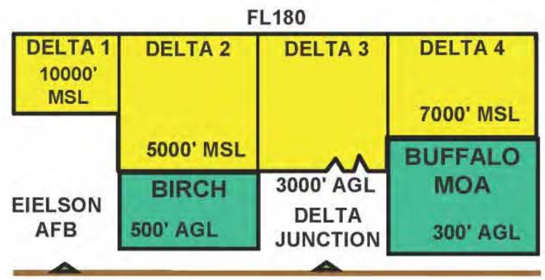
For **ADDITIONAL INFORMATION** about Air Force flight activity in Alaska see our web site at:
http://www.jber.af.mil/11af/alaskaairspaceinfo

THIS PAMPHLET IS PROVIDED FOR INFORMATION PURPOSES ONLY. IT IS NOT INTENDED TO REPLACE OFFICIAL GUIDANCE AVAILABLE THROUGH THE FAA. IT IS STRONGLY RECOMMENDED THAT PILOTS CONTACT THE NEAREST FLIGHT SERVICE STATION FOR THE LATEST NOTAM INFORMATION ON RESTRICTED/SPECIAL USE AIRSPACE.

DELTA MOA



SIDE VIEW

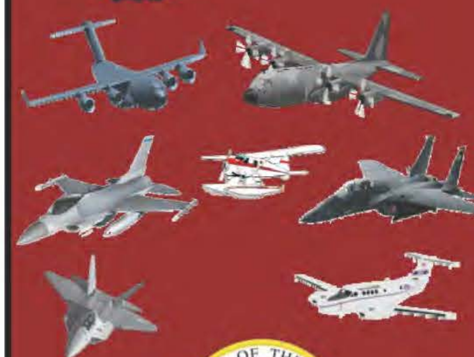


This MOA will only be utilized during major flying exercises (2011 dates listed on flip side). Usage times will be published 30 days prior to the start of each exercise. Exercise activation times will normally consist of a morning and evening period. Each period will last 1.5 – 2.5 hours. Reference the web page below and Eielson AFB NOTAMs for actual activation times. This MOA will be returned to the FAA immediately upon completion of military use. Activation times are published 30 days in advance to encourage pilots to plan their flights around the short activation windows. MOAs are "VFR see and avoid" airspace, and VFR flight through the MOA is not restricted, although extreme caution is advised due to the high speed/dynamic nature of military flying. Utilize SUAIS if you must transit an active MOA. Emergency aircraft, air evacuation, Life Flight, and fire fighting aircraft will always have priority over military training. Please refer to the Alaska Airspace webpage for the most current information:
http://www.jber.af.mil/11af/alaskaairspaceinfo

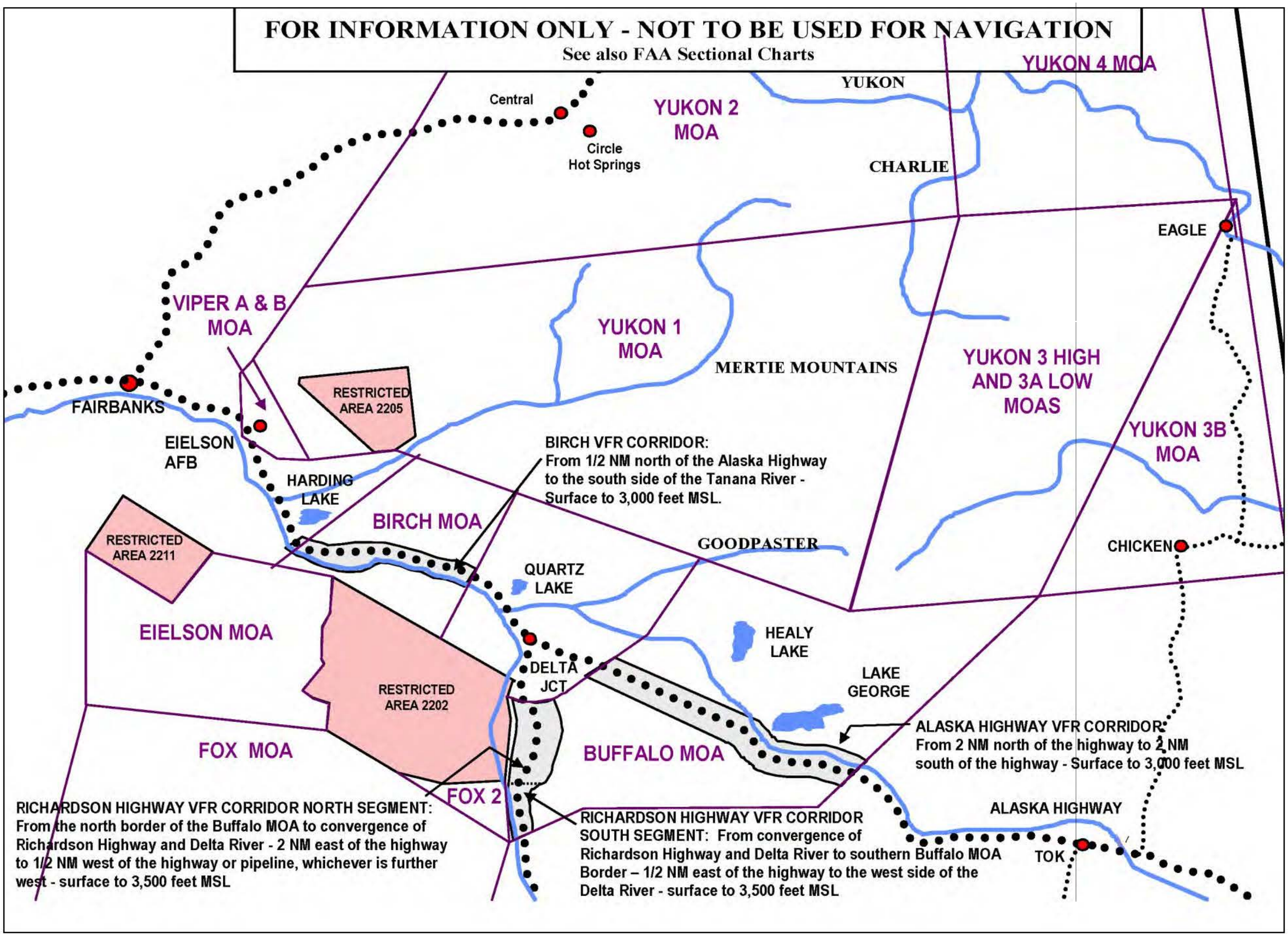
ALASKA
MILITARY OPERATIONS AREAS (MOAs)

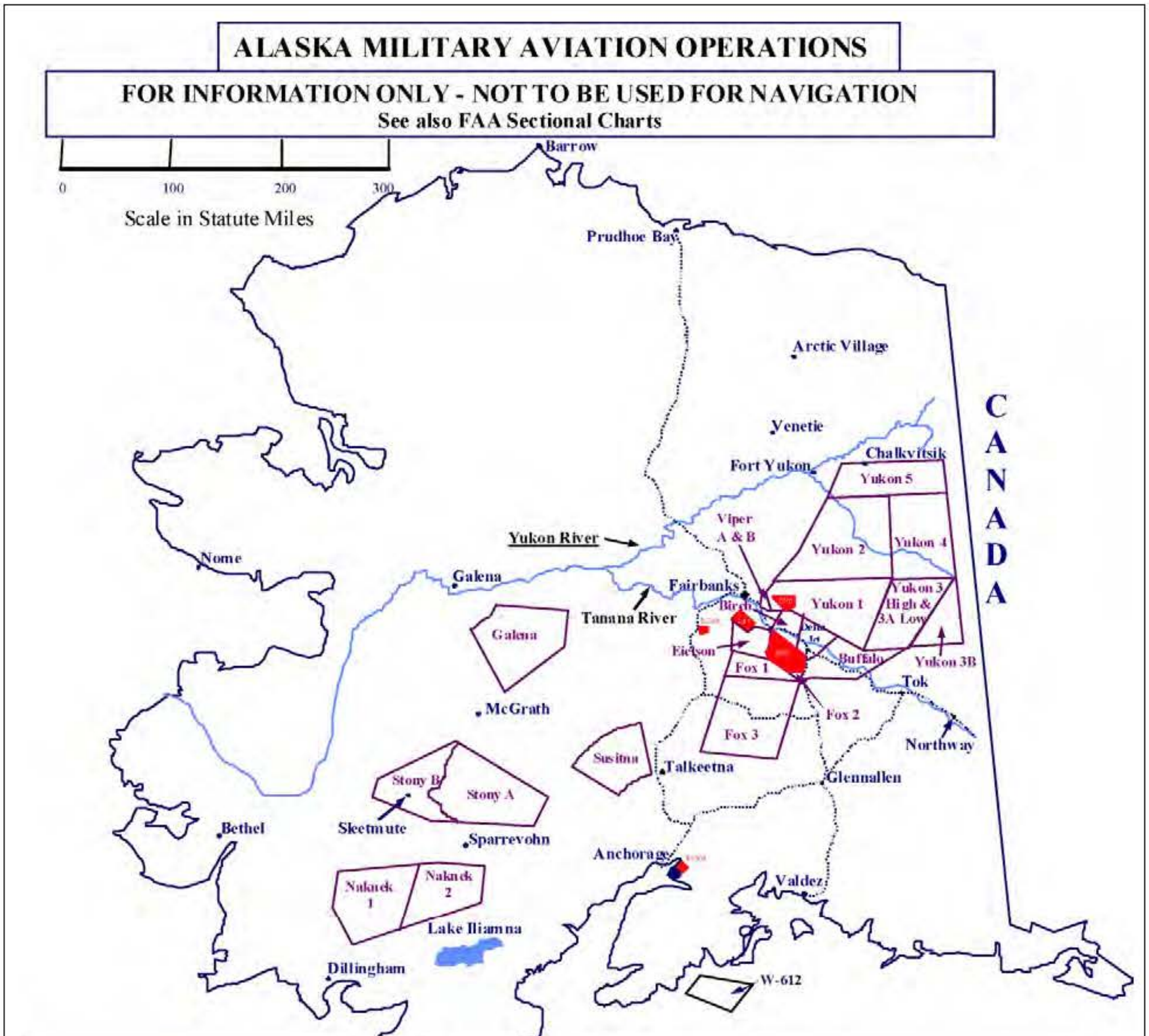
Special Use Airspace Information Service (SUAIS)

IMPORTANT INFORMATION ON MILITARY AIRCRAFT OPERATIONS IN ALASKA FOR ALL PILOTS, RESIDENTS, AND VISITORS



2011 EDITION
DEPARTMENT OF THE AIR FORCE
11TH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON


FOR INFORMATION ONLY - NOT TO BE USED FOR NAVIGATION
See also FAA Sectional Charts
YUKON 4 MOA
YUKON
Central
YUKON 2 MOA
Circle Hot Springs
CHARLIE
EAGLE
VIPER A & B MOA
YUKON 1 MOA
MERTIE MOUNTAINS
YUKON 3 HIGH AND 3A LOW MOAS
FAIRBANKS
RESTRICTED AREA 2205
EIELSON AFB
YUKON 3B MOA
BIRCH VFR CORRIDOR:
From 1/2 NM north of the Alaska Highway to the south side of the Tanana River - Surface to 3,000 feet MSL.
HARDING LAKE
BIRCH MOA
RESTRICTED AREA 2211
GOODPASTER
CHICKEN
QUARTZ LAKE
EIELSON MOA
HEALY LAKE
DELTA JCT
LAKE GEORGE
RESTRICTED AREA 2202
ALASKA HIGHWAY VFR CORRIDOR:
From 2 NM north of the highway to 2 NM south of the highway - Surface to 3,000 feet MSL
FOX MOA
BUFFALO MOA
FOX 2
ALASKA HIGHWAY
RICHARDSON HIGHWAY VFR CORRIDOR NORTH SEGMENT:
From the north border of the Buffalo MOA to convergence of Richardson Highway and Delta River - 2 NM east of the highway to 1/2 NM west of the highway or pipeline, whichever is further west - surface to 3,500 feet MSL
RICHARDSON HIGHWAY VFR CORRIDOR SOUTH SEGMENT: From convergence of Richardson Highway and Delta River to southern Buffalo MOA Border – 1/2 NM east of the highway to the west side of the Delta River - surface to 3,500 feet MSL
TOK



SPECIAL USE AIRSPACE LIMITS

MILITARY OPERATIONS AREAS (MOA):

BIRCH	500' AGL	4999' MSL
BUFFALO	300' AGL	6,999' MSL
EIELSON	100' AGL	17,999' MSL
YUKON 1	100' AGL	17,999' MSL
YUKON 2	100' AGL	17,999' MSL
YUKON 3 HIGH	10,000' MSL	17,999' MSL
YUKON 3A LOW	100' AGL	9,999' MSL
YUKON 3B	2,000' AGL	17,999' MSL
YUKON 4	100' AGL	17,999' MSL
YUKON 5	5,000' AGL	17,999' MSL
VIPER A	500' AGL	10,000' MSL
VIPER B	10,001' MSL	17,999' MSL

FOX 1	5,000' AGL - 17,999' MSL
FOX 2	7,000' MSL - 17,999' MSL
FOX 3	5,000' AGL - 17,999' MSL
GALENA	1,000' AGL - 17,999' MSL
NAKNEK 1	3,000' AGL - 17,999' MSL
NAKNEK 2	3,000' AGL - 17,999' MSL
STONY A	100' AGL - 17,999' MSL
STONY B	2,000' AGL - 17,999' MSL
SUSITNA	** - 17,999' MSL

** FOR SUSITNA, FLOOR OF 5,000' AGL OR 10,000' MSL, WHICHEVER IS HIGHER

RESTRICTED AREAS:

R-2202A/B	SURF	9,999' MSL
R-2202C	10,000' MSL	FL 310
R-2202D	31,001' MSL	UNLIMITED
R-2203A/B	SURF	11,000' MSL
R-2203C	SURF	5,000' MSL
R-2205	SURF	20,000' MSL
R-2206	SURF	8,800' MSL
R-2211	SURF	FL 310

WARNING AREA:

W-612	SURF	FL 290

WHAT IS THE SPECIAL USE AIRSPACE INFORMATION SERVICE?

The Special Use Airspace Information Service (SUAIS) is a 24-hour service provided to civilian pilots. The SUAIS's primary function is to provide civilian pilots with information regarding Air Force flight operations in the MOAs and Restricted Airspace within central Alaska, so they may better plan their flights through and around the SUA. The service provides "near real time" information on Air Force flight activity in the Fairbanks and Delta Junction areas. SUAIS also provides information on Army artillery firing and known helicopter operations.

CONTACT INFORMATION AND HOURS OF OPERATION

Eielson Range Control is an airspace facilitator at Eielson Air Force Base, Alaska which is staffed during the 10 hour flying window. This window is normally from 9 a.m. to 7 p.m., Monday through Friday (except federal holidays), and times when military flying is in progress in the Interior Alaskan MOAs and Restricted Areas. After hours, telephone and radio callers will receive the airspace status through a recorded message. Eielson Range Control is equipped with UHF and VHF radios and radar displays.

Pilots can call SUAIS at 1-800-758-8723 or (372-6913 from the Fairbanks area). If airborne, contact Eielson Range Control, VHF 125.3. SUAIS information can also be found on the Joint Base Elmendorf-Richardson home page at:
http://www.jber.af.mil/11af/alaskaairspaceinfo
then select "Special Use Airspace Information Service". Beyond SUAIS radio range, Flight Service Stations can give status of special use airspace, to include Military Training Routes.

WHY USE SUAIS?

SAFETY: Eielson Range Control monitors all military activity in MOAs and can advise civilian pilots of high-speed military aircraft operating in them. The MOAs adjacent to the Richardson and ALCAN Highways between Tok, Delta Junction, and Fairbanks are areas of heavy general aviation use. VFR transit corridors have been established along the highways, but the MOAs are of special concern since they are subject to flights at high speed/low altitude by military aircraft.

EFFICIENCY: Military Restricted Areas are not always in use. Eielson Range Control can advise civilian aircraft of current restricted area status.

EMERGENCY: Eielson Range Control can assist in clearing military aircraft out of this airspace if requested by the FAA or other agencies for emergency operations such as air ambulance missions or fire fighting operations.

HOW TO USE SUAIS

PREFLIGHT: Call the SUAIS phone number to find out which MOAs along your route of flight are scheduled to be active and during what times.

INITIAL RADIO CONTACT WITH RANGE CONTROL: Provide your present position (with reference to a NAVAID or a well known geographic reference), altitude, and intended route of flight. Conveying intentions is critical to helping the system enhance flight safety in areas that lack low altitude radio coverage.

POSITION REPORTS: To promote safety and improve everyone's situational awareness, pilots are encouraged to provide routing and destination updates, particularly if their route of flight changes.

SUAIS RADIO AND RADAR COVERAGE

Radio relay stations permit pilots flying as low as a few hundred feet to contact Eielson Range Control in the Tanana Valley between Lake George and Fairbanks. Aircraft flying in mountainous terrain to the east of the Tanana River will need to be as high as the tops of the highest terrain in their immediate vicinity. The general area of coverage is bounded by 50 miles North of Circle, Fairbanks to the west, Black Rapids to the south, and Lake George to the east. The ability to detect light aircraft without transponders is limited. **Transponder use is highly recommended.**

Eielson Range Control ***does not*** provide air traffic control services. They can provide information on the status of airspace and the ***approximate*** locations of ***military aircraft*** in the area. IFR vectoring, processing of flight plans, etc., is not provided. ***Use of the SUAIS constitutes an acknowledgment, understanding, and acceptance of these limitations.***

MAJOR FLYING EXERCISE SCHEDULE

The following schedule lists dates when higher than usual levels of activity can be expected in Alaskan MOAs. Military flying activities ***are not limited*** to these dates. Military aircraft may be encountered at any time throughout the year.

Military flight activity will normally increase two business days prior to major exercises to allow pilots to familiarize themselves with the airspace. The major exercises dates are listed below.

Dates below subject to change
Check the web site for updates

Red Flag Alaska 11-01	**18 Apr -- 29 Apr 2011**
Northern Edge 11	**13 June -- 24 June 2011**
Red Flag Alaska 11-02	**11 July -- 22 July 2011**
Red Flag Alaska 11-03	**15 Aug -- 26 Aug 2011**
Red Flag Alaska 12-1	**10 Oct -- 21 Oct 2011**

http://www.jber.af.mil/11af/alaskaairspaceinfo

D.5 REFERENCES

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Appendix E
Noise

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ACRONYMS AND ABBREVIATIONS

AGL	above ground level
ANSI	American National Standards Institute
ASA	Acoustical Society of America
ATV	all-terrain vehicle
BASH	bird/wildlife-aircraft strike hazard
BMP	best management practice
CHABA	Committee on Hearing, Bioacoustics and Biomechanics
CHCN	Committee of the Health Council of the Netherlands
dB	decibels
dB L_{pk}	decibels peak noise level
dBA	decibels measured on the A-weighted scale
DNL	day-night average sound level
DoD	U.S. Department of Defense
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FICAN	Federal Interagency Committee on Aircraft Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
GIS	geographic information system
HE	high explosive
Hz	hertz
IN	inert
LAE	sound exposure level, a-weighted
lb	pounds
L_{dnmr}	onset rate–adjusted day-night average sound level
L_{eq}	equivalent continuous sound pressure level
L_{max}	maximum sound level
L_{pk}	peak noise level
MOA	Military Operations Area
MR_NMAP	MOA-Range NOISEMAP
MTR	Military Training Route
NATO	North Atlantic Treaty Organization
NIOSH	National Institute for Occupational Safety and Health
NIPTS	noise-induced permanent threshold shift
NPS	National Park Service
NRC/NAS	National Research Council/National Academy of Sciences
OSHA	Occupational Safety and Health Administration
PHL	potential hearing loss
PK 15	peak noise level exceeding only 15 percent of the time
psf	pounds per square foot
PTS	permanent threshold shift
SARNAM	Small Arms Range Noise Assessment Model
SEL	sound exposure level
TTS	temporary threshold shift
UCLA	University of California, Los Angeles
UK	United Kingdom
USARAK	U.S. Army Alaska
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WHO	World Health Organization

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APPENDIX E
NOISE

Appendix E provides a general noise primer to educate the reader on what constitutes noise, how it is measured, and the studies that were used in support of how and why noise is modeled.

Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects.

Section E.1 of this appendix describes how sound is measured and summarizes noise impacts in terms of community acceptability and land use compatibility. Section E.2 gives detailed descriptions of the effects of noise that lead to the impact guidelines presented in Section E.1. Section E.3 provides a description of the specific methods used to predict aircraft noise, including a detailed description of sonic booms.

E.1 NOISE DESCRIPTORS AND IMPACT

Aircraft operating in military airspace generate two types of sound. One is "subsonic" noise, which is continuous sound generated by the aircraft's engines and also by air flowing over the aircraft itself. The other is sonic booms (where authorized for supersonic), which are transient impulsive sounds generated during supersonic flight. These are quantified in different ways.

Section E.1.1 describes the characteristics used to describe sound. Section E.1.2 describes the specific noise metrics used for noise impact analysis. Section E.1.3 describes how environmental impact and land use compatibility are judged in terms of these quantities.

E.1.1 Quantifying Sound

Measurement and perception of sound involve two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Because sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or hertz (Hz).

Amplitude. The loudest sounds the human ear can comfortably hear have acoustic energy one trillion times the acoustic energy of sounds the ear can barely detect. Because of this vast range, attempts to represent sound amplitude by pressure are generally unwieldy. Sound is, therefore, usually represented on a logarithmic scale with a unit called the decibel (dB). Sound measured on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Because of the logarithmic nature of the decibel scale, sounds levels do not add and subtract directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that the combination of decibel values consists of first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The difference in dB between two sounds represents the ratio of the amplitudes of those two sounds. Because human senses tend to be proportional (i.e., detect whether one sound is twice as big as another) rather than absolute (i.e., detect whether one sound is a given number of pressure units bigger than another), the decibel scale correlates well with human response.

Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound *intensity* but only a 50 percent decrease in perceived *loudness* because of the nonlinear response of the human ear (similar to most human senses).

The one exception to the exclusive use of levels, rather than physical pressure units, to quantify sound is in the case of sonic booms. As described in Section E.3.2, sonic booms are coherent waves with specific characteristics. There is a long-standing tradition of describing individual sonic booms by the amplitude of the shock waves, in pounds per square foot (psf). This is particularly relevant when assessing structural effects as opposed to loudness or cumulative community response. In this environmental analysis, sonic booms are quantified by either dB or psf, as appropriate for the particular impact being assessed.

Frequency. The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A weighting (ANSI 1988). Sound levels that have been so adjusted are referred to as A weighted sound levels.

The audible quality of high thrust engines in modern military combat aircraft can be somewhat different than other aircraft, including (at high throttle settings) the characteristic nonlinear crackle of high thrust engines. The spectral characteristics of various noises are accounted for by A-weighting, which approximates the response of the human ear but does not necessarily account for quality. There are other, more detailed, weighting factors that have been applied to sounds. In the 1950s and 1960s, when noise from civilian jet aircraft became an issue, substantial research was performed to determine what characteristics of jet noise were a problem. The metrics Perceived Noise Level and Effective Perceived Noise Level were developed. These accounted for nonlinear behavior of hearing and the importance of low frequencies at high levels, and for many years airport/airbase noise contours were presented in terms of Noise Exposure Forecast, which was based on Perceived Noise Level and Effective Perceived Noise Level. In the 1970s, however, it was realized that the primary intrusive aspect of aircraft noise was the high noise level, a factor which is well represented by A-weighted levels and day–night average sound level (DNL). The refinement of Perceived Noise Level, Effective Perceived Noise Level, and Noise Exposure Forecast was not significant in protecting the public from noise.

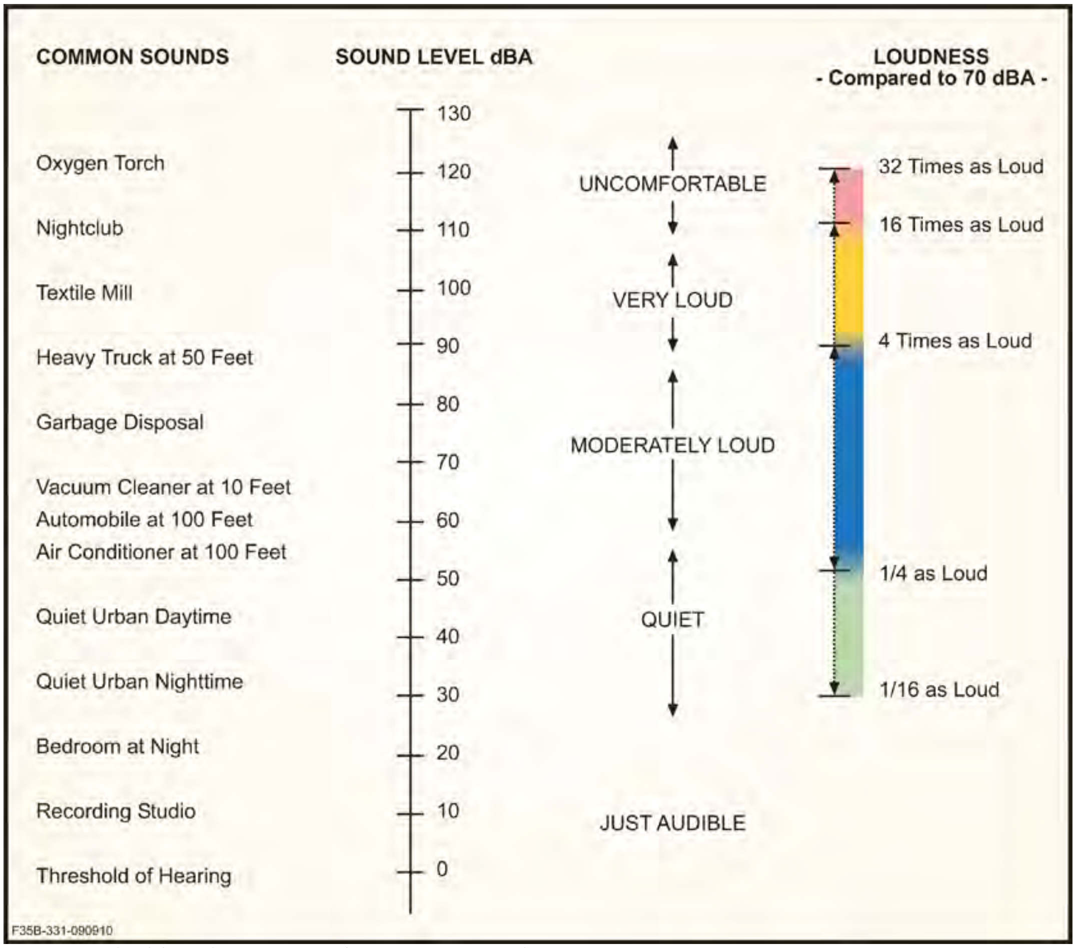
There has been continuing research on noise metrics and the importance of sound quality, sponsored by the U.S. Department of Defense (DoD) for military aircraft noise and by the Federal Aviation Administration (FAA) for civil aircraft noise. The metric L_{dnmr}, which is described later and accounts for the increased annoyance of rapid onset rate of sound, is a product of this long-term research.

The amplitude of A weighted sound levels is measured in dB. It is common for some noise analysts to denote the unit of A-weighted sounds by dBA. As long as the use of A-weighting is understood, there is no difference between dB or dBA: it is only important that the use of A-weighting be made clear. In this environmental analysis, A-weighted sound levels are reported as dB.

A-weighting is appropriate for continuous sounds, which are perceived by the ear. Impulsive sounds, such as sonic booms, are perceived by more than just the ear. When experienced indoors, there can be secondary noise from rattling of the building. Vibrations may also be felt. C-weighting (ANSI 1988) is applied to such sounds. This is a frequency weighting that is relatively flat over the range of human hearing (about 20 Hz to 20,000 Hz) that rolls off above 5,000 Hz and below 50 Hz. In this study, C-weighted sound levels are used for the assessment of sonic booms and other impulsive sounds. As with A-weighting, the unit is dB, but dBC is sometimes used for clarity. In this study, sound levels are reported in both A-weighting and C-weighting dBs, and C-weighted metrics are denoted when used.

Time Averaging. Sound pressure of a continuous sound varies greatly with time, so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the display of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or 1 second (slow). The formal definitions of fast and slow levels are somewhat complex, with details that are important to the makers and users of instrumentation. They may, however, be thought of as levels corresponding to the root mean-square sound pressure measured over the 1/8-second or 1-second periods.

The most common uses of the fast or slow sound level in environmental analysis is in the discussion of the maximum sound level that occurs from the action, and in discussions of typical sound levels. Figure E-1 is a chart of A-weighted sound levels from typical sounds. Some (air conditioner, vacuum cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle passby. Some (urban daytime, urban nighttime) are averages over some extended period. A variety of noise metrics have been developed to describe noise over different time periods. These are described in Section E.1.2.



Source: Derived from the *Handbook of Noise Control*, Harris 1979, FICAN 1997.

Figure E-1. Typical A-Weighted Sound Levels of Common Sounds

E.1.2 Noise Metrics

E.1.2.1 Maximum Sound Level

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or L_{max}. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleeping, or other common activities. Table E-1 reflects L_{max} values for typical aircraft associated with this assessment operating at the indicated flight profiles and power settings. Noise levels presented in Table E-1 reflect noise propagation through standard atmospheric conditions (70 degrees Fahrenheit and 59 percent relative humidity). Atmospheric conditions affect transmission loss, the degree to which noise attenuates over distance (e.g., through spreading of noise energy and absorption by air molecules. Noise levels may also vary from the numbers shown in Table E-1 due to location-specific variables such as refraction of sound waves as they travel through different air masses and reflection of sound waves off solid objects. Tactical ground vehicles are another source of military training noise. Table E-2 shows L_{max} level associated with operation tactical ground vehicles.

Table E-1. Representative Maximum Sound Levels (L_{max}) Associated With Aircraft Overflights

Aircraft (engine type)	Power Setting	Power Unit	Lmax Values (in dBA) At Varying Distances (In Feet)				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	99.9	91.7	82.2	68.2	57.8
B-1	97.5%	RPM	126.5	118.3	109.9	98.3	88.7
F-15 (P220)	90%	NC	111.4	104.3	96.6	85	74.7
F-16 (P229)	93%	NC	113.7	106.2	98.1	86.1	75.7
F-22	100%	ETR	119.7	112.4	104.6	93	82.9
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97	88.9	78.8	60.2	46.4
B-1	90%	RPM	98.8	91.9	84.5	72.8	62
F-15 (P220)	75%	NC	88.5	81.6	74.3	63.2	53.4
F-16 (P229)	83.5%	NC	92.6	85.5	77.8	66.1	55.6
F-22	43%	ETR	111.3	103.9	95.9	83.9	73.1

Key: Engine Unit of Power: RPM=Revolutions Per Minute; ETR=Engine Thrust Ratio; NC=Engine Core RPM; and NF=Engine Fan RPM.
Source: SELCalc2 (Flyover Noise Calculator), Using NoiseMap 6/7 and Maximum Omega10 Result as the defaults.

Table E-2. Representative Maximum Sound Levels (L_{max}) Associated With Tactical Ground Vehicles

Type	Distance (feet)	Speed (mph)	Noise Level (dB)
Stationary Stryker	20	0	78
Moving Stryker	60	50	85
Bradley Fighting Vehicle	98	20	80

Key: dB=Decibel; mph=Miles Per Hour.
Source: USARAK 2004.

E.1.2.2 Sound Exposure Level

Individual time-varying noise events have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. Although the maximum sound level reached during the event provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The sound exposure level (abbreviated SEL or L_{AE} for A-weighted sounds) combines both of these characteristics into a single metric.

SEL is a composite metric that represents both the intensity of a sound and its duration. Mathematically, the mean square sound pressure is computed over the duration of the event, then multiplied by the duration in seconds, and the resultant product is turned into a sound level. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Table E-3 shows SEL values corresponding to the aircraft and power settings reflected in Table E-1.

Because the SEL and the maximum sound level are both used to describe single events, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

SEL can be computed for C-weighted levels (appropriate for impulsive sounds), and the results denoted CSEL or L_{CE}. SEL for A-weighted sound is sometimes denoted ASEL. Within this study, SEL is used for A weighted sounds and CSEL for C-weighted.

Table E-3. Representative Sound Exposure Levels (SEL)

Aircraft (engine type)	Power Setting	Power Unit	SEL Values (in dBA) At Varying Distances (In Feet)				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	102.6	96.2	88.5	76.9	68.3
B-1	97.5%	RPM	129.5	123.1	116.5	107.3	99.3
F-15 (P220)	90%	NC	117.3	112	106.1	97	88.4
F-16 (P229)	93%	NC	116.5	110.8	104.6	95	86.3
F-22	100%	ETR	124.2	118.7	112.7	103.5	95.2
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97.9	91.5	83.3	67	55
B-1	90%	RPM	103.4	98.3	92.7	83.4	74.4
F-15 (P220)	75%	NC	94.2	89.2	83.6	74.9	66.9
F-16 (P229)	83.5%	NC	97.4	92.1	86.3	76.9	68.2
F-22	43%	ETR	114.9	109.3	103.1	93.5	84.5

Key: Engine Unit of Power: RPM=Revolutions Per Minute; ETR=Engine Thrust Ratio; NC=Engine Core RPM; and NF=Engine Fan RPM.
Source: SELCalc2 (Flyover Noise Calculator), Using NoiseMap 6/7 and Maximum Omega10 Result as the defaults.

E.1.2.3 Equivalent Sound Level

For longer periods of time, total sound is represented by the equivalent continuous sound pressure level (L_{eq}). L_{eq} is the average sound level over some time period (often an hour or a day, but any explicit time span can be specified), with the averaging being done on the same energy basis as used for SEL. SEL and L_{eq} are closely related, with L_{eq} being SEL over some time period normalized by that time.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while L_{eq} is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise.

E.1.2.4 Day–Night Average Sound Level

Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10 dB penalty to events that occur after 10 pm and before 7 am. If L_{eq} is computed over a 24-hour period with this nighttime penalty applied, the result is the DNL. DNL is the community noise metric recommended by the U.S. Environmental Protection Agency (EPA) (EPA 1974) and has been adopted by most Federal agencies (FICON 1992). It has been well established that DNL correlates well with long-term community response to noise (Schultz 1978, Finegold et al. 1994). This correlation is presented in Section E.1.3 of this appendix.

DNL accounts for the total, or cumulative, noise impact at a given location, and for this reason is often referred to as a "cumulative" metric. It was noted earlier that, for impulsive sounds, such as sonic booms, C-weighting is more appropriate than A weighting. DNL computed with C-weighting is denoted CDNL or L_{Cdn}. This procedure has been standardized, and impact interpretive criteria similar to those for DNL have been developed (CHABA 1981).

E.1.2.5 Onset-Adjusted Monthly Day–Night Average Sound Level

Aircraft operations in military training airspace generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occurring at random times and varying from day to day and week to week. This situation differs from most community noise environments, in which noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset.

To represent these differences, the conventional DNL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans (Plotkin et al. 1987; Stusnick et al. 1992, 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second require no adjustment. The DNL is then determined in the same manner as for conventional aircraft noise events and is designated as onset rate–adjusted day-night average sound level (abbreviated L_{dnmr}).

Because of the irregular occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The monthly average is denoted L_{dnmr}. Noise levels are calculated the same way for both DNL and L_{dnmr}. L_{dnmr} is interpreted by the same criteria as used for DNL.

E.1.2.6 Peak Noise Level

The peak noise level metric characterizes the strength of impulsive noise such as sonic boom peak overpressure or munitions detonations. Peak noise level can be expressed in pounds per square foot (psf) or in decibel version (dB L_{pk}). The units psf are most often used when relating boom amplitude to human or animal response, although the direct physical pressure, as reflected by the unit (dB L_{pk}) is most commonly used when assessing effects on structures. Peak noise levels are strongly affected by meteorological conditions such as humidity and temperature which vary over time. To account for the variability in peak noise levels due to meteorological effects, peak noise levels are generally specified as the level not exceeded for a certain percentage of the time. As an example, noise generated by detonation of a certain munitions type may exceed 115 dBP at a certain location only in the 15 percent of days with the most unfavorable meteorological conditions. The metric used to describe the peak noise level exceeding only 15 percent of the time is PK 15(met). Peak noise levels associated with several munitions noise events are provided in Table E-4 using the metric PK 15(met).

Table E-4. Peak Noise Level Associated With Munitions Noise Events

Munitions Type	Noise Level (in dB PK 15(met) at Lateral Distance From Firing Point (in miles)		
	1 mile	5 miles	10 miles
12-guage shotgun	80.0	59.0	51.0
30-06 rifle	86.0	64.5	56.0
60 mm mortar (inert round)	97.5	73.5	67.0
81 mm mortar (inert round)	99.0	75.0	68.5
120 mm mortar (inert round)	105.0	81.0	74.5
105 mm howitzer (inert round)	104.5	80.5	74.0
155 mm howitzer (inert round)	111.0	87.5	80.5
Mk-83/GBU-32 1,000 pound class bomb (high explosive)	144.0	120.0	113.5
Mk-81/SDB 250-pound class bomb (high explosive)	139.5	115.5	98.0

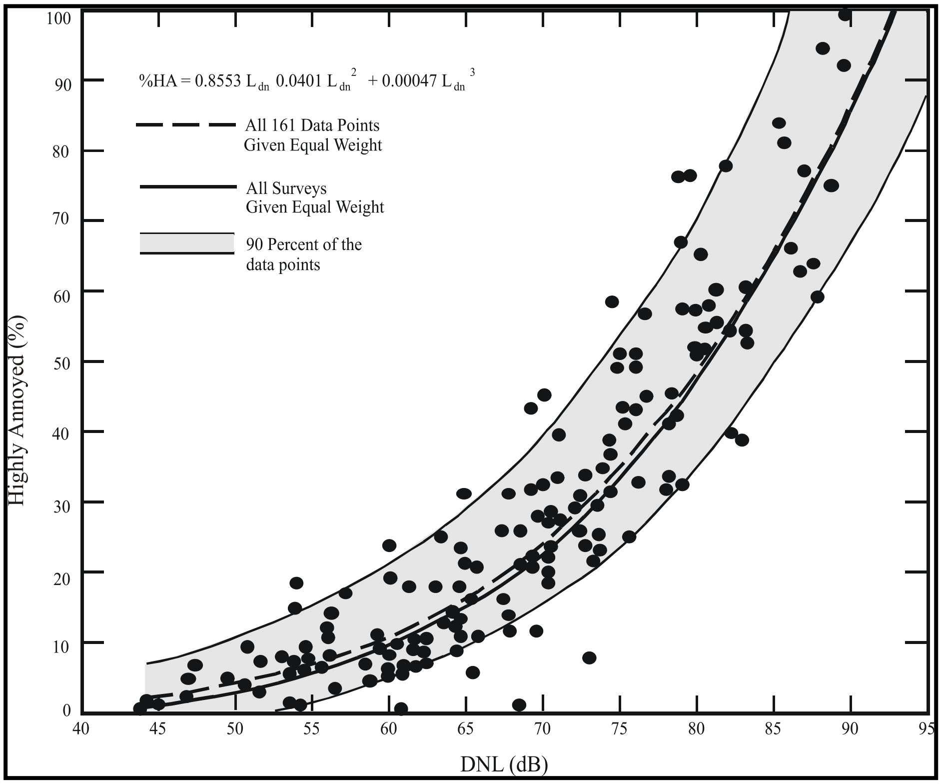
Note: Peak noise level estimates for shotgun and rifle calculated using Small Arms Range Noise Assessment Model version 2.6.2003-06-06; Peak noise levels associated with all other weapons calculated using BNOISE2 version 1.3.2003-07-03; noise levels rounded to the nearest 0.5 dB

E.1.3 Noise Impact

E.1.3.1 Community Reaction

Studies of long-term community annoyance to numerous types of environmental noise show that DNL correlates well with the annoyance. Schultz (1978) showed a consistent relationship between DNL and annoyance. Shultz's original curve fit (Figure E-2) shows that there is a remarkable consistency in results of attitudinal surveys which relate the percentages of groups of people who express various degrees of annoyance when exposed to different DNL.

Another study reaffirmed this relationship (Fidell et al. 1989). Figure E-3 shows an updated form of the curve fit (Finegold et al. 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. For example, individuals with autism are often very strongly affected by sudden noises (Tang et al. 2002). Persons with autism often report experiencing oversensitivity to noise and are often particularly sensitive to high-pitched or sudden onset noises (Grandin 1991). Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.



Source: Schultz 1978.

Figure E-2. Community Surveys of Noise Annoyance

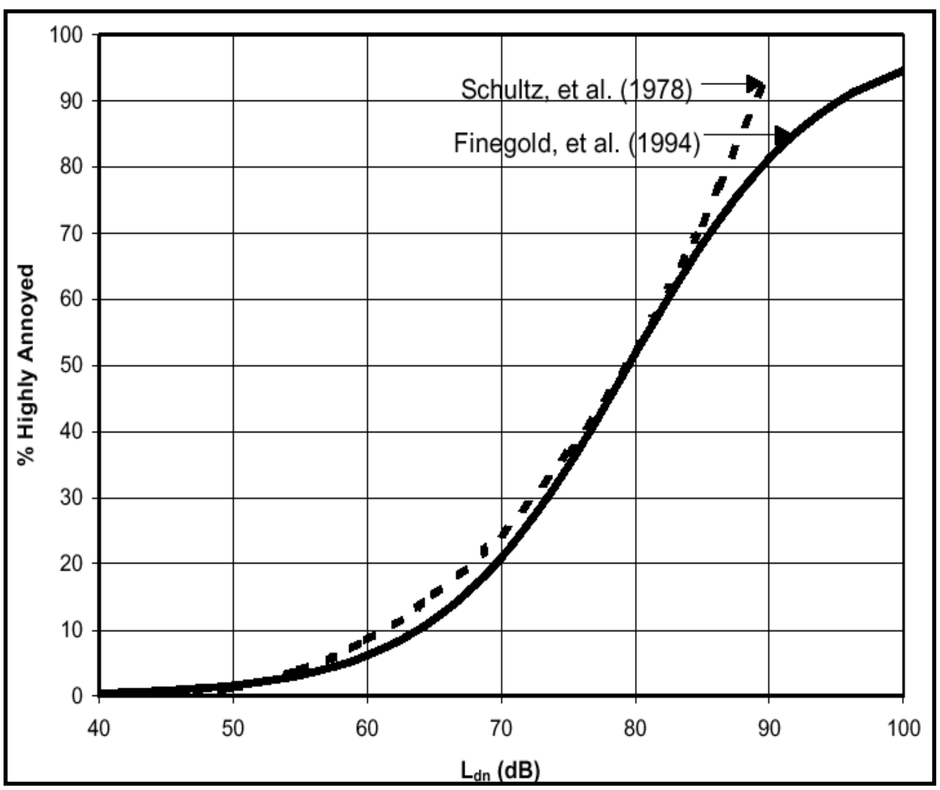


Figure E-3. Response of Communities to Noise; Comparison of Original (Schultz 1978) and Current (Finegold et al. 1994) Curve Fits

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. DNL accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community (ANSI 1980, 1988, 2005; EPA 1974; FICON 1992; FICUN 1980).

While DNL is the best metric for quantitatively assessing cumulative noise impact, it does not lend itself to intuitive interpretation by non-experts. Accordingly, it is common for environmental noise analyses to include other metrics for illustrative purposes. A general indication of the noise environment can be presented by noting the maximum sound levels which can occur and the number of times per day noise events will be loud enough to be heard. Use of other metrics as supplements to DNL has been endorsed by Federal agencies (FICON 1992).

The Schultz curve is generally applied to annual average DNL. In Section E.1.2, L_{dnmr} was described and presented as being appropriate for quantifying noise in military airspace. The Schultz curve is used with L_{dnmr} as the noise metric. L_{dnmr} is always equal to or greater than DNL, so impact is generally higher than would have been predicted if the onset rate and busiest-month adjustments were not accounted for.

There are several points of interest in the noise-annoyance relation. The first is DNL of 65 dB. This is a level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. The second is DNL of 55 dB, which was identified by EPA as a level "...requisite to protect the public health and welfare with an adequate margin of safety," (EPA 1974) which is essentially a level below which adverse impact is not expected. The third is DNL of 75 dB. This is the lowest level at which adverse health effects could be credible (EPA 1974). The very high annoyance levels correlated with DNL of 75 dB make such areas unsuitable for residential land use.

Sonic boom exposure is measured by C-weighting, with the corresponding cumulative metric being CDNL. Correlation between CDNL and annoyance has been established, based on community reaction to impulsive sounds (CHABA 1981). Values of the C weighted equivalent to the Schultz curve are different than that of the Schultz curve itself. Table E-5 shows the relation between annoyance, DNL, and CDNL.

Table E-5. Relation Between Annoyance, DNL and CDNL

DNL	% Highly Annoyed	CDNL
45	0.83	42
50	1.66	46
55	3.31	51
60	6.48	56
65	12.29	60
70	22.10	65

Key: CDNL = C-weighted day-night average sound level; DNL = day-night average sound level.

Interpretation of CDNL from impulsive noise is accomplished by using the CDNL versus annoyance values in Table E-5. CDNL can be interpreted in terms of an "equivalent annoyance" DNL. For example, CDNL of 52, 61, and 69 dB are equivalent to DNL of 55, 65, and 75 dB, respectively. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

E.1.3.2 Land Use Compatibility

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described

above, the best noise exposure metric for this correlation is the DNL or L_{dnmr} for military overflights. Impulsive noise can be assessed by relating CDNL to an "equivalent annoyance" DNL, as outlined in Section E.1.3.1.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, and Housing and Urban Development; EPA; and the Veterans Administration. Since the issuance of these guidelines, Federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, DoD and FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations (DOT 1984). These guidelines are reprinted in Table E-6, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (note the footnote "*" in the table), they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL values above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases a change in noise level, rather than an absolute threshold, may be a more appropriate measure of impact.

Table E-6. Land Use Compatibility, Noise Exposure, and Accident Potential

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	**Name**	**Clear Zone**	**APZ I**	**APZ II**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80+ dB**
10	**Residential**							
11	Household units							
11.11	Single units; detached	N	N	Y[1]	A[11]	B[11]	N	N
11.12	Single units; semidetached	N	N	N	A[11]	B[11]	N	N
11.13	Singe units; attached row	N	N	N	A[11]	B[11]	N	N
11.21	Two units; side-by-side	N	N	N	A[11]	B[11]	N	N
11.22	Two units; one above the other	N	N	N	A[11]	B[11]	N	N
11.31	Apartments; walk up	N	N	N	A[11]	B[11]	N	N
11.32	Apartments; elevator	N	N	N	A[11]	B[11]	N	N
12	Group quarters	N	N	N	A[11]	B[11]	N	N
13	Residential hotels	N	N	N	A[11]	B[11]	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	A[11]	B[11]	C[11]	N
16	Other residential	N	N	N[1]	A[11]	B[11]	N	N
20	**Manufacturing**							
21	Food and kindred products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
22	Textile mill products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]
24	Lumber and wood products (except furniture); manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
25	Furniture and fixtures; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
26	Paper and allied products; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
27	Printing, publishing, and allied industries	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
28	Chemicals and allied products; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]

Table E-6. Land Use Compatibility, Noise Exposure, and Accident Potential *(continued)*

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	**Name**	**Clear Zone**	**APZ I**	**APZ II**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80+ dB**
29	Petroleum refining and related industries	N	N	N	Y	Y[12]	Y[13]	Y[14]
30	**Manufacturing**							
31	Rubber and misc. plastic products, manufacturing	N	N[2]	N[2]	Y	Y[12]	Y[13]	Y[14]
32	Stone, clay and glass products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
33	Primary metal industries	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
34	Fabricated metal products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks; manufacturing	N	N	N[2]	Y	A	B	N
39	Miscellaneous manufacturing	N	Y[2]	Y[2]	Y	Y[12]	Y[13]	Y[14]
40	**Transportation, communications, and utilities**							
41	Railroad, rapid rail transit, and street railroad transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
42	Motor vehicle transportation	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
43	Aircraft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
44	Marine craft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
45	Highway and street right-of-way	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
46	Automobile parking	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
47	Communications	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
48	Utilities	N[3]	Y[4]	Y	Y	Y	Y[12]	Y[13]
49	Other transportation communications and utilities	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
50	**Trade**							
51	Wholesale trade	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
52	Retail trade-building materials, hardware and farm equipment	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
53	Retail trade-general merchandise	N[2]	N[2]	Y[2]	Y	A	B	N
54	Retail trade-food	N[2]	N[2]	Y[2]	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N[2]	N[2]	Y[2]	Y	A	B	N
56	Retail trade-apparel and accessories	N[2]	N[2]	Y[2]	Y	A	B	N
57	Retail trade-furniture, home furnishings and equipment	N[2]	N[2]	Y[2]	Y	A	B	N
58	Retail trade-eating and drinking establishments	N	N	N[2]	Y	A	B	N
59	Other retail trade	N	N[2]	Y[2]	Y	A	B	N
60	**Services**							
61	Finance, insurance, and real estate services	N	N	Y[6]	Y	A	B	N
62	Personal services	N	N	Y[6]	Y	A	B	N
62.4	Cemeteries	N	Y[7]	Y[7]	Y	Y[12]	Y[13]	Y[14,2,1]
63	Business services	N	Y[8]	Y[8]	Y	A	B	N
64	Repair services	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
65	Professional services	N	N	Y[6]	Y	A	B	N
65.1	Hospitals, nursing homes	N	N	N	A*	B*	N	N
65.1	Other medical facilities	N	N	N	Y	A	B	N
66	Contract construction services	N	Y[6]	Y	Y	A	B	N

Table E-6. Land Use Compatibility, Noise Exposure, and Accident Potential *(continued)*

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	**Name**	**Clear Zone**	**APZ I**	**APZ II**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80+ dB**
67	Governmental services	N[6]	N	Y[6]	Y*	A*	B*	N
68	Educational services	N	N	N	A*	B*	N	N
69	Miscellaneous services	N	N[2]	Y[2]	Y	A	B	N
70	**Cultural, entertainment and recreational**							
71	Cultural activities (including churches)	N	N	N[2]	A*	B*	N	N
71.2	Nature exhibits	N	Y[2]	Y	Y*	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	A	B	N	N
72.11	Outdoor music shell, amphitheatres	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	N	N	N	Y[17]	Y[17]	N	N
73	Amusements	N	N	Y[8]	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N Y	Y[8,9,10]	Y	Y*	A*	B*	N
75	Resorts and group camps	N	N	N	Y*	Y*	N	N
76	Parks	N	Y[8]	Y[8]	Y*	Y*	N	N
79	Other cultural, entertainment, and recreation	N[9]	Y[9]	Y[9]	Y*	Y*	N	N
80	**Resources production and extraction**							
81	Agriculture (except livestock)	Y[16]	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
81.5 to 81.7	Livestock farming and animal breeding	N	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
82	Agricultural related activities	N	Y[5]	Y	Y[18]	Y[19]	N	N
83	Forestry activities and related services	N[5]	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
84	Fishing activities and related services	N[5]	Y[5]	Y	Y	Y	Y	Y
85	Mining activities and related services	N	Y[5]	Y	Y	Y	Y	Y
89	Other resources production and extraction	N	Y[5]	Y	Y	Y	Y	Y

1 Suggested maximum density of 1-2 dwelling units per acre possibly increased under a Planned Unit Development where maximum lot coverage is less than 20 percent.

2 Within each land use category, uses exist where further definition may be needed due to the variation of densities in people and structures. Shopping malls and shopping centers are considered incompatible in any APZ.

3 The placing of structures, buildings, or above ground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones, these items are prohibited. See AFI 32-7063 and AFI 32-1026 for specific guidance.

4 No passenger terminals and no major above ground transmission lines in APZ I.

5 Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.

6 Low-intensity office uses only. Meeting places, auditoriums, etc., are not recommended.

7 Excludes chapels.

8 Facilities must be low intensity.

9 Clubhouse not recommended.

10 Areas for gatherings of people are not recommended.

11a Although local conditions may require residential use, it is discouraged in DNL 65-69 dB and strongly discouraged in DNL 70-74 dB. An evaluation should be conducted prior to approvals, indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones, and that there are no viable alternative locations.

11b Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor NLR for DNL 65-69 dB and DNL 70-74 dB should be incorporated into building codes and considered in individual approvals.

11c NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, and design and use of berms and barriers can help mitigate outdoor exposure, particularly from near ground level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures which only protect interior spaces.

Table E-6. Land Use Compatibility, Noise Exposure, and Accident Potential *(continued)*

12 Measures to achieve the same NLR as required for facilities in the DNL 65-69 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

13 Measures to achieve the same NLR as required for facilities in the DNL 70-74 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

14 Measures to achieve the same NLR as required for facilities in the DNL 75-79 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

15 If noise sensitive, use indicated NLR; if not, the use is compatible.

16 No buildings.

17 Land use is compatible provided special sound reinforcement systems are installed.

18 Residential buildings require the same NLR required for facilities in the DNL 65-69 dB range.

19 Residential buildings require the same NLR required for facilities in the DNL 70-74 dB range.

20 Residential buildings are not permitted.

21 Land use is not recommended. If the community decides the use is necessary, hearing protection devices should be worn by personnel.

Key: SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation; Y = Yes; land use and related structures are compatible without restriction; N = No; land use and related structures are not compatible and should be prohibited; A, B, or C = Land use and related structures generally compatible; measures to achieve Noise Level Reduction of A (25 db), B (30 db), or C (35 db) should be incorporated into the design and construction of structures; A*, B*, or C* = Land use generally compatible with Noise Level Reduction. However, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes; * = The designation of these uses as “compatible” in this zone reflects individual Federal agency and program consideration of general cost and feasibility factors, as well as past community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

E.2 NOISE EFFECTS

The discussion in Section E.1.3 presented the global effect of noise on communities. The following sections describe particular noise effects. These effects include non-auditory health effects, annoyance, speech interference, sleep disturbance, noise-induced hearing impairment, noise effects on animals and wildlife, effects on property values, noise effects on structures, terrain, and cultural resources.

E.2.1 Annoyance

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the EPA as any negative subjective reaction on the part of an individual or group (EPA 1974). As noted in the discussion of DNL above, community annoyance is best measured by that metric.

Because the EPA Levels Document (EPA 1974) identified DNL of 55 dB as “. . . requisite to protect public health and welfare with an adequate margin of safety,” it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. From a noise exposure perspective, that would be an ideal selection. However, financial resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion which protects those most impacted by noise, and which can often be achieved on a practical basis (FICON 1992). This corresponds to about 12 percent of the exposed population being highly annoyed.

Although DNL of 65 dB is widely used as a benchmark for significant noise impact, and is often an acceptable compromise, it is not a statutory limit, and it is appropriate to consider other thresholds in particular cases. Local ordinances and regulations have been adopted by many municipal governments to prevent civilian development near military installations that would be incompatible with noise generated by military operations. The decision to adopt such measures, and the specific content of the ordinances and regulations, is up to the municipal government. In many cases, the 65 DNL noise contour line is adopted as the threshold level above which land use restrictions are invoked.

Community annoyance from sonic booms is based on CDNL, as discussed in Section E.1.3. These effects are implicitly included in the "equivalent annoyance" CDNL values in Table E-5, since those were developed from actual community noise impact.

E.2.2 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Speech is an acoustic signal characterized by rapid fluctuations in sound level and frequency pattern. It is essential for optimum speech intelligibility to recognize these continually shifting sound patterns. Not only does noise diminish the ability to perceive the auditory signal, but it also reduces a listener's ability to follow the pattern of signal fluctuation. In general, interference with speech communication occurs when intrusive noise exceeds about 60 dB (FICON 1992).

Indoor speech interference can be expressed as a percentage of sentence intelligibility among two people speaking in relaxed conversation approximately 3 feet apart in a typical living room or bedroom (EPA 1974). The percentage of sentence intelligibility is a non-linear function of the (steady) indoor background A-weighted sound level. Such a curve-fit yields 100 percent sentence intelligibility for background levels below 57 dB and yields less than 10 percent intelligibility for background levels above 73 dB. The function is especially sensitive to changes in sound level between 65 dB and 75 dB. As an example of the sensitivity, a 1 dB increase in background sound level from 70 dB to 71 dB yields a 14 percent decrease in sentence intelligibility. The sensitivity of speech interference to noise at 65 dB and above is consistent with the criterion of DNL 65 dB generally taken from the Schultz curve. This is consistent with the observation that speech interference is the primary cause of annoyance.

Classroom Criteria. The effect of aircraft noise on children is a controversial area. Certain studies indicate that, in certain situations, children are potentially more sensitive to noise compared to adults. For example, adults average roughly 10 percent better than young children on speech intelligibility tests in high noise environments (ASA 2000). Some studies indicate that noise negatively impacts classroom learning (e.g., Shield and Dockrell 2008).

In response to noise-specific and other environmental studies, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (1997), requires Federal agencies to ensure that their policies, programs, and activities address environmental health and safety risks and to identify any disproportionate risks to children. While the issue of noise impacts on children's learning is not fully settled, in May 2009, the American National Standards Institute (ANSI) published a classroom acoustics standard entitled "Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools" (ANSI 2002). At present, complying with the standard is voluntary in most locations. Essentially, the criteria states that when the noisiest hour is dominated by noise from such sources as aircraft, the limits for most classrooms are an hourly average A-weighted sound level of 40 dB, and the A-weighted sound level must not exceed 40 dB for more than 10 percent of the hour. For schools located near airfields, indoor noise levels would have to be lowered by 35–45 dBA relative to outdoor levels (ANSI 2009).

E.2.3 Sleep Disturbance

Sleep disturbance is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep disturbance may be measured in either of two ways. “Arousal” represents actual awakening from sleep, while a change in “sleep stage” represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons et al. 1989). The analysis concluded that a lack of reliable in-home studies, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur under normal community conditions. An extensive study of sleep interference in people’s own homes (Ollerhead et al. 1992) showed very little disturbance from aircraft noise.

There is some controversy associated with these studies, so a conservative approach should be taken in judging sleep interference. Based on older data, the EPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (EPA 1974). Assuming an outdoor-to-indoor noise level reduction of 20 dB for typical dwelling units, this corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

A 1984 publication reviewed the probability of arousal or behavioral awakening in terms of SEL (Kryter 1984). Figure E-4, extracted from Figure 10.37 of Kryter (1984), indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects. Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

It was noted in the early sleep disturbance research that the controlled laboratory studies did not account for many factors that are important to sleep behavior, such as habituation to the environment and previous exposure to noise and awakenings from sources other than aircraft noise. In the early 1990s, field studies were conducted to validate the earlier laboratory work. The most significant finding from these studies was that an estimated 80 to 90 percent of sleep disturbances were not related to individual outdoor noise events, but were instead the result of indoor noise sources and other non-noise-related factors. The results showed that there was less of an effect of noise on sleep in real-life conditions than had been previously reported from laboratory studies.

The interim Federal Interagency Committee on Noise (FICON) dose-response curve that was recommended for use in 1992 was based on the most pertinent sleep disturbance research that was conducted through the 1970s, primarily in laboratory settings. After that time, considerable field research was conducted to evaluate the sleep effects in peoples’ normal, home environment. Laboratory sleep studies tend to show higher values of sleep disturbance than field studies because people who sleep in their own homes are habituated to their environment and, therefore, do not wake up as easily (FICAN 1997).

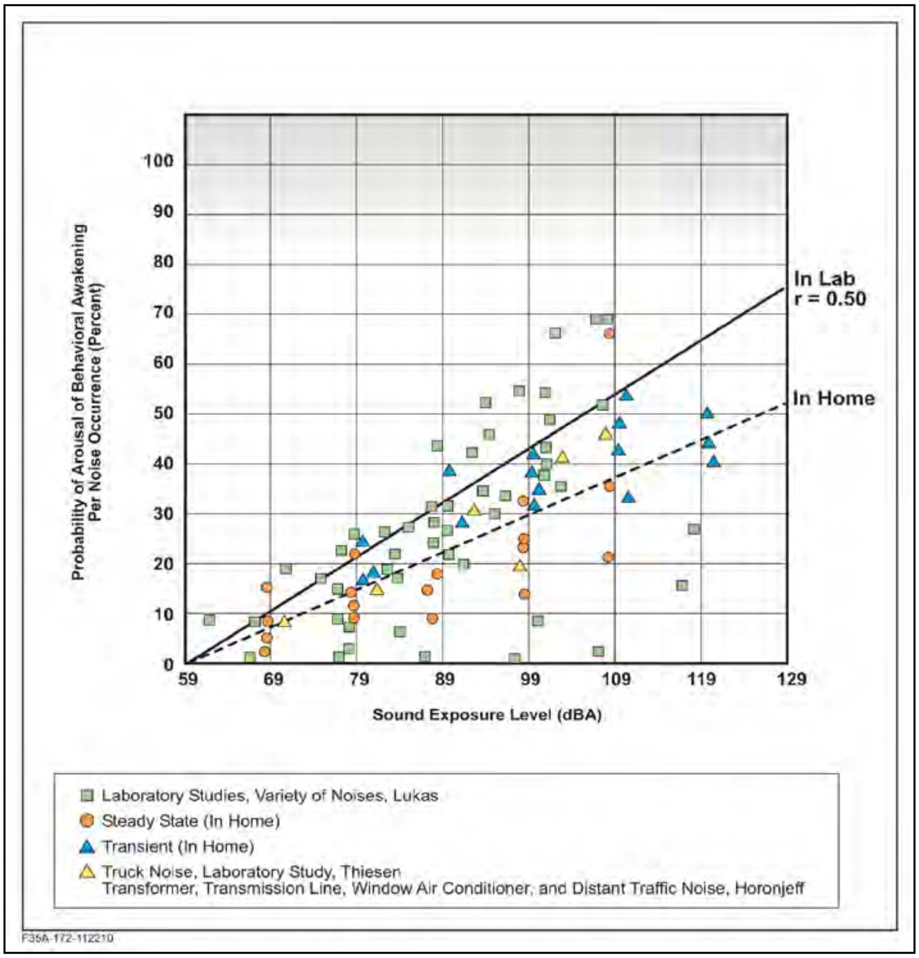


Figure E-4. Plot of Sleep Awakening Data versus Indoor SEL

Based on the new information, the Federal Interagency Committee on Aircraft Noise (FICAN) updated its recommended dose-response curve in 1997, depicted as the lower curve in Figure E-5. This figure is based on the results of three field studies (Ollerhead et al. 1992; Fidell et al. 1994; Fidell et al. 1995a and 1995b), along with the datasets from six previous field studies.

The new relationship represents the higher end, or upper envelope, of the latest field data. It should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened" or the "maximum percent awakened" for a given residential population. According to this relationship, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB, compared to 10 percent using the 1992 curve. An indoor SEL of 58 dB is equivalent to outdoor SEL's of 73 and 83 dB respectively assuming 15 and 25 dB noise level reduction from outdoor to indoor with windows open and closed, respectively.

The FICAN 1997 curve is represented by the following equation:

Percent Awakenings = 0.0087 x [SEL – 30]1.79

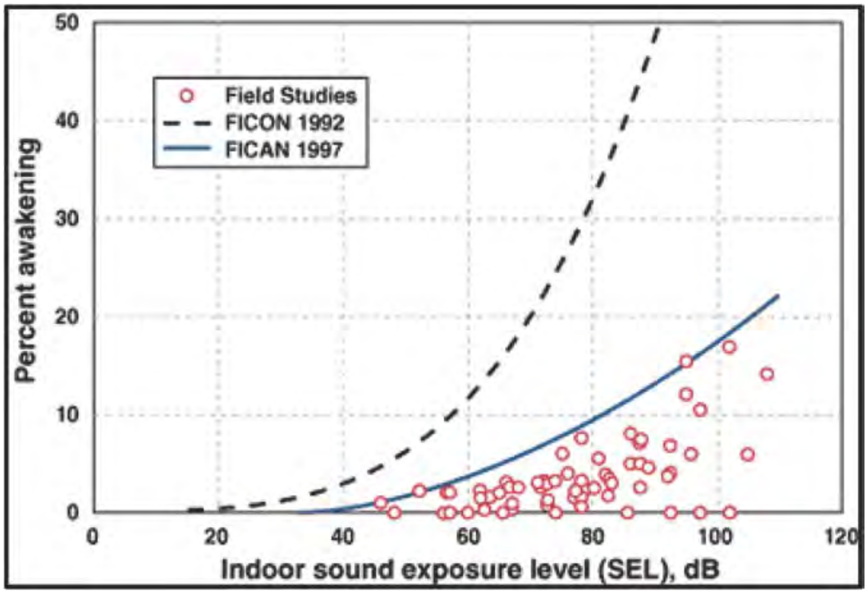


Figure E-5. FICAN's 1997 Recommended Sleep Disturbance Dose-Response Relationship

Note the relatively low percentage of awakenings to fairly high noise levels. People think they are awakened by a noise event, but usually the reason for awakening is otherwise. For example, the 1992 UK CAA study found the average person was awakened about 18 times per night for reasons other than exposure to an aircraft noise – some of these awakenings are due to the biological rhythms of sleep and some to other reasons that were not correlated with specific aircraft events.

In July 2008 ANSI and the Acoustical Society of America (ASA) published a method to estimate the percent of the exposed population that might be awakened by multiple aircraft noise events based on statistical assumptions about the probability of awakening (or not awakening) (ANSI 2008). This method relies on probability theory rather than direct field research/experimental data to account for multiple events.

Figure E-6 depicts the awakenings data that form the basis and equations of ANSI (2008). The curve labeled 'Eq. (B1)' is the relationship between noise and awakening endorsed by FICAN in 1997. The ANSI recommended curve labeled 'Eq. 1)' quantifies the probability of awakening for a population of sleepers who are exposed to an outdoor noise event as a function of the associated indoor SEL in the bedroom. This curve was derived from studies of behavioral awakenings associated with noise events in "steady state" situations where the population has been exposed to the noise long enough to be habituated. The data points in Figure E-6 come from these studies. Unlike the FICAN curve, the ANSI 2008 curve represents the average of the field research data points.

In December 2008, FICAN recommended the use of this new estimation procedure for future analyses of behavioral awakenings from aircraft noise. In that statement, FICAN also recognized that additional sleep disturbance research is underway by various research organizations, and results of that work may result in additional changes to FICAN's position. Until that time, FICAN recommends the use of ANSI (2008).

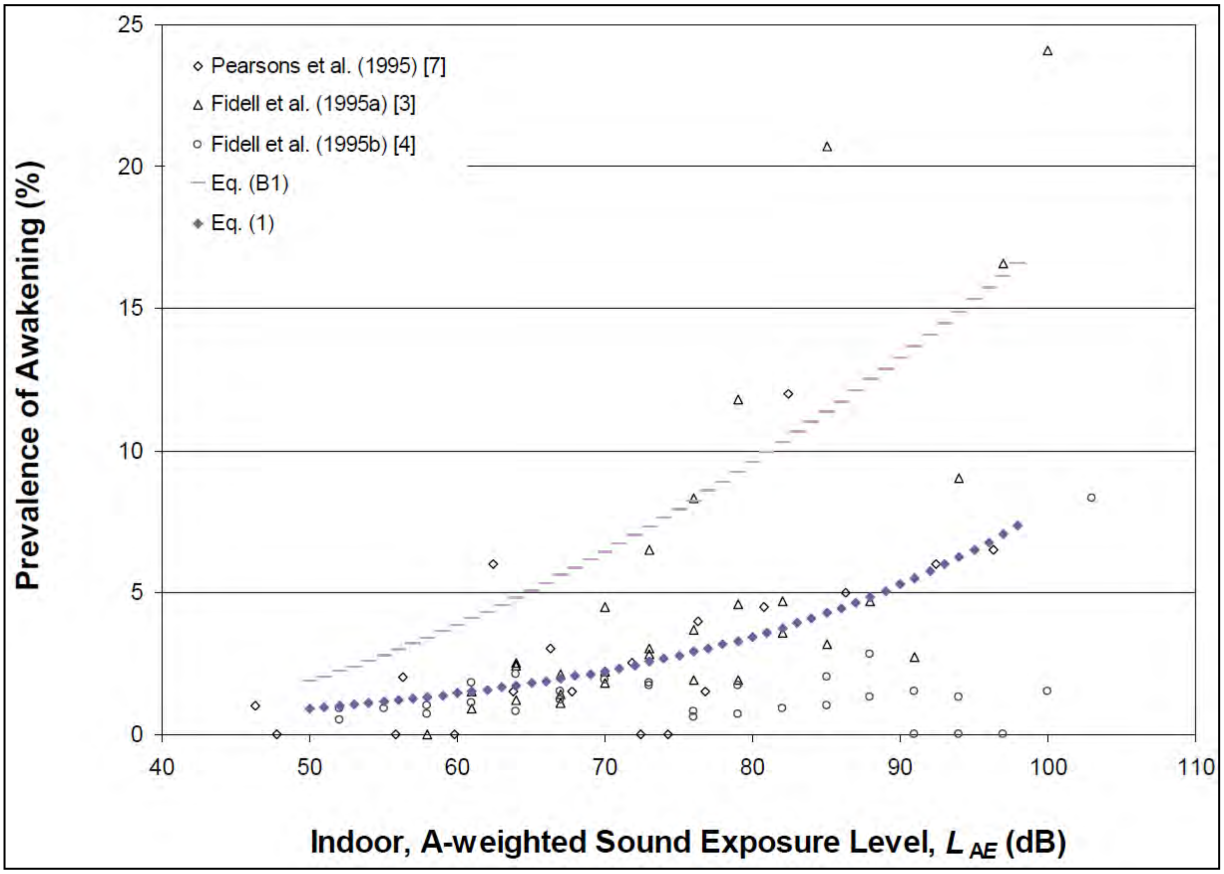


Figure E-6. Relation Between Indoor SEL and Percentage of Persons Awakened as Stated in ANSI/ASA S12.9-2008/Part 6

E.2.4 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound; i.e. a shift in the hearing threshold to a higher level. This change can either be a temporary threshold shift (TTS), or a permanent threshold shift (PTS) (Berger et al. 1995). TTS can result from exposure to loud noise over a given amount of time, yet the hearing loss is not necessarily permanent. An example of TTS might be a person attending a loud music concert. After the concert is over, the person may experience a threshold shift that may last several hours, depending upon the level and duration of exposure. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing ability eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover from the strain and fatigue of exposure. A common example of PTS is the result of working in a loud environment such as a factory. It is important to note that a temporary shift (TTS) can eventually become permanent (PTS) over time with continuous exposure to high noise levels. Thus, even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a TTS results in a PTS is difficult to identify and varies with a person's sensitivity.

Considerable data on hearing loss have been collected and analyzed by the scientific/medical community. It has been well established that continuous exposure to high noise levels will damage human hearing (EPA 1978). The Occupational Safety and Health Administration (OSHA) regulation of 1971 standardizes the limits on workplace noise exposure for protection from hearing loss as an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (the average level is based on a 5 dB decrease per doubling of exposure time) (DOL 1971). Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is an average sound level of 70 dB over a 24-hour period.

The EPA established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5 dB PTS (EPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics identified 75 dB as the minimum level at which hearing loss may occur (CHABA 1977). Finally, the World Health Organization (WHO) has concluded that environmental and leisure-time noise below an L_{eq}24 value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 2000).

E.2.4.1 Hearing Loss and Aircraft Noise

The 1982 EPA Guidelines report specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the noise-induced permanent threshold shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (EPA 1982). This effect is also described as potential hearing loss (PHL). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kHz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS, or Ave NIPTS for short. The Ave NIPTS that can be expected for noise exposure as measured by the DNL metric is given in Table E-7.

For example, for a noise exposure of 80 dB DNL, the expected lifetime average value of NIPTS is 2.5 dB, or 6.0 dB for the 10th percentile. Characterizing the noise exposure in terms of DNL will usually overestimate the assessment of hearing loss risk as DNL includes a 10 dB weighting factor for aircraft operations occurring between 10 p.m. and 7 a.m. If, however, flight operations between the hours of 10 p.m. and 7 a.m. account for 5 percent or less of the total 24-hour operations, the overestimation is on the order of 1.5 dB.

Table E-7. Average NIPTS and 10th Percentile NIPTS as a Function of DNL

DNL	Ave. NIPTS dB*	10^{th} Percentile NIPTS dB*
75–76	1.0	4.0
76–77	1.0	4.5
77–78	1.6	5.0
78–79	2.0	5.5

79–80	2.5	6.0
80–81	3.0	7.0
81–82	3.5	8.0
82–83	4.0	9.0
83–84	4.5	10.0
84–85	5.5	11.0
85–86	6.0	12.0
86–87	7.0	13.5
87–88	7.5	15.0
88–89	8.5	16.5
89–90	9.5	18.0

Note: *Rounded to the nearest 0.5 dB.

From a civilian airport perspective, the scientific community has concluded that there is little likelihood that the resulting noise exposure from aircraft noise could result in either a temporary or permanent hearing loss. Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). The EPA criterion ($L_{eq}24 = 70$ dBA) can be exceeded in some areas located near airports, but that is only the case outdoors. Inside a building, where people are more likely to spend most of their time, the average noise level will be much less than 70 dBA (Eldred and von Gierke 1993). Eldred and von Gierke also report that "several studies in the U.S., Japan, and the U.K. have confirmed the predictions that the possibility for permanent hearing loss in communities, even under the most intense commercial take-off and landing patterns, is remote."

With regard to military airbases, as individual aircraft noise levels are increasing with the introduction of new aircraft, a 2009 DoD policy directive requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB and higher (DoD 2009). Specifically, DoD components are directed to "*use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss.*" This does not preclude populations outside the 80 DNL contour, i.e. at lower exposure levels, from being at some degree of risk of hearing loss. However, the analysis should be restricted to populations within this contour area, including residents of on-base housing. The exposure of workers inside the base boundary area should be considered occupational and evaluated using the appropriate DoD component regulations for occupational noise exposure.

With regard to military airspace activity, studies have shown conflicting results. A 1995 laboratory study measured changes in human hearing from noise representative of low-flying aircraft on Military Training Routes (MTRs) (Nixon et al. 1993). The potential effects of aircraft flying along MTRs is of particular concern because of maximum overflight noise levels can exceed 115 dB, with rapid increases in noise levels exceeding 30 dB per second. In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. Fifty percent of the subjects showed no change in hearing levels, 25 percent had a temporary 5 dB *increase* in sensitivity (the people could hear a 5 dB wider range of sound than before exposure), and 25 percent had a temporary 5 dB decrease in sensitivity (the people could hear a 5 dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts showed an increase in sensitivity of up to 10 dB.

In another study of 115 test subjects between 18 and 50 years old in 1999, temporary threshold shifts were measured after laboratory exposure to military low-altitude flight noise (Ising et al. 1999).

According to the authors, the results indicate that repeated exposure to military low-altitude flight noise with L_{max} greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise induced hearing loss in humans.

Aviation and typical community noise levels near airports are not comparable to the occupational or recreational noise exposures associated with hearing loss. Studies of aircraft noise levels associated with civilian airport activity have not definitively correlated permanent hearing impairment with aircraft activity. It is unlikely that airport neighbors will remain outside their homes 24 hours per day, so there is little likelihood of hearing loss below an average sound level of 75 dB DNL. Near military airbases, average noise levels above 75 dB may occur, and while new DoD policy dictates that NIPTS be evaluated, no research results to date have definitively related permanent hearing impairment to aviation noise.

E.2.5 Nonauditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, “It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body.” Psychological stresses may cause a physiological stress reaction that could result in impaired health. The National Institute for Occupational Safety and Health (NIOSH) and EPA commissioned the Committee on Hearing, Bioacoustics and Biomechanics (CHABA) in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA’s conclusion was that:

> Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been further studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older subjects and those not reporting impaired hearing ability (Rosenlund et al. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak et al. 1990). Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles et al. 1990).

Most studies of nonauditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day).

At the 1988 International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential nonauditory health effects in the work place" (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two University of California, Los Angeles (UCLA) researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Center for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds et al. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time average sound levels below 75 dB. The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwarze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increases in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus (Harris 1997).

E.2.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task. While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.

- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

E.2.7 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires Federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

E.2.7.1 Effects on Learning and Cognitive Abilities

In 2002 ANSI refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children (ANSI 2002). ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to surrounding land uses and the shielding of outdoor noise from the indoor environment. The ANSI acoustical performance criteria for schools include the requirement that the 1-hour-average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic-feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic-feet. This would require schools be constructed such that, in quiet neighborhoods indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (ANSI 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (ANSI 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (ANSI 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in the last 20 years. Several studies suggest that aircraft noise can affect the academic performance of schoolchildren. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning. Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green et al. 1982). Researchers have found that tasks involving central processing and language comprehension (such

as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993, Evans et al. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997, Cohen et al. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines et al. 2001a, 2001b). Similar studies involving the testing of attention, memory, and reading comprehension of school children located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans et al. 1998, Haines et al. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as one-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines et al. 2001a, 2001b). In contrast, a 2002 study found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests were equal to that of the control group once the airport was closed (Hygge et al. 2002).

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the WHO and a North Atlantic Treaty Organization (NATO) working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (WHO 2000, NATO 2000).

E.2.7.2 Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, authors have looked at blood pressure readings to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans et al. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 mm for children attending schools located in noisier environments compared to 86.77 mm for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 mm and 45.16 for the control group (Cohen et al. 1980).

Although the literature appears limited, studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines et al. 2001b, 2001c). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport,

as compared to children at another school far away (Chen et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Fisch 1977, Andrus et al. 1975, Wu et al. 1995).

E.2.8 Noise Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed outlines those studies that have focused on the observations of the behavioral and in some cases physiological responses of animals to jet aircraft overflight and sonic booms.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and others that are subsequently related to an individual's or group's responsiveness. Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or interfere with behavioral patterns (Manci et al. 1988; Warren et al. 2006), however this would be a greater concern for continuous or near-continuous noise sources (e.g., compressors, near busy highway) than for intermittent, brief exposures such as military jet overflight. Increased noise levels reduce the distance and area over which acoustic signals can be perceived by animals (Barber et al. 2009). Although the effects are likely temporary, aircraft noise may cause masking of auditory signals within exposed faunal communities.

Animals rely on hearing to avoid predators, obtain food, and communicate and attract other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as eardrum rupture or temporary and permanent hearing threshold shifts, are unlikely given the noise levels produced by aircraft overflights. Secondary effects may include nonauditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects. These include population decline and habitat loss. Most of the effects of noise are mild enough to be undetectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al. 1988; Radle 2007; NPS 2011) and that response of unconfined wildlife and domestic animals to aircraft overflight under most circumstances has minimal biological significance.

Considerable research has been conducted on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and the introduction of supersonic commercial jet aircraft (e.g., the Concorde). According to Manci et al. (1988), the foundation of information created from that focus did not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes. A 1996 review revealed that aircraft noise plays a minor role in disturbance to animals when separated from the optical stimuli and uses examples of nearly soundless paragliders causing panic flights (Kempf and Hüppop 1996). This research indicated that sonic booms and jet aircraft noise can cause startle responses, but do not result in severe consequences and that severity of response depends upon previous exposure. These authors felt that aside from the rare panic flights causing accidents, negative consequences of aircraft noise *per se* on individuals and populations are not proven (Kempf and Hüppop 1996). Similarly, the Air Force has conducted many studies and defines a startle or startle response as the sequence of events that occurs when an animal is surprised, including behavioral responses (muscular flinching, alerting and running) and physiological changes (e.g., elevated heart rate and other physiologic changes) (Air Force 1994). The startle is a natural response that helped the ancestors of domestic stock avoid predators. If the behavioral component of the startle is uncontrolled, particularly if the animal runs or jumps without concern for its safety, it is often called a panic. Completely uncontrolled panics are rare in mammals (Air Force 1994).

Pepper et al. (2003) suggest that many past studies were inconclusive and based on relatively small sample sizes and that more work is needed to determine if noise adversely impacts wildlife. Research into the effects of noise on wildlife often presents conflicting results because of the variety of factors and variables that can affect and/or interfere with the determination of the actual effects that human-produced noise is having on any given animal (Radle 2007).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables related to the aircraft, including its size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed-wing versus rotary-wing [helicopter]) and characteristics of the overflight may also produce different levels of disturbance (e.g., one-way pass overhead in level flight versus circling and approaching more closely), with varying animal responses (Smith et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

Periodic literature reviews have concluded that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise/overflight ranges from performing a visual scan to alerting to a startle response (Manci et al. 1988; Bowles 1995; NPS 2011). The intensity and duration of the startle response appears to be dependent on the species, whether there is a group or an individual; what the individuals are doing (e.g., initial stages of pair bonding versus brooding eggs versus communally roosting); and whether there have been previous exposures. Responses range from movement of the head in the apparent direction of the noise source, to alerting, and in rarer cases to flight. In the case of large mammals responses range from alerting to running. More severe responses such as trampling, bunching, or stampeding have been documented, generally with confined animals, Manci et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals. In addition to flight, other concerns with regard to impact from noise disturbance on wildlife or livestock include the following possible responses and effects:

- Possible injury due to trampling or uncontrolled running or flight
- Increased expenditure of energy, particularly during critical periods (e.g., breeding, winter)
- Decreased time spent on life functions (e.g., seeking food or mates)

- Temporary masking of auditory signals from other animals of the same species, predators, or prey (e.g., noise could prevent an animal from hearing the approach of a predator)
- Damage to eggs or nestlings if a bird is startled from its nest
- Temporary exposure of eggs or young in nest to environmental conditions or predation if a parent flees
- Temporary increased risk of predation if startled animals flee from nests, roosts, or other protective cover

Although the above-listed concerns have been raised in the literature and examples have been documented, studies of unconfined wildlife and domestic animals to overflight by military jet aircraft at 500 feet AGL or higher have not shown measurable changes in population size or reproductive success at the population level or other significant biological impact under normal conditions.

E.2.8.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights, but generally seem to habituate to the disturbances over a period of time. Significant adverse responses are infrequently documented and these generally occur under unusual circumstances.

Bowles et al. (1990) reviewed 209 aircraft noise claims files against the Air Force. Within that sample the major source of loss was panics induced in naïve animals, and secondarily losses due to reproductive failure and failure to gain weight properly. These claims spanned a 32-year period and were remarkably infrequent compared to the number of flight-miles logged over rural areas. Claims found to be legitimate by Air Force examiners cost the Air Force less than $24,000 per year nationwide, and over 62 percent of this cost could be attributed to a single claim for animals that escaped after stampeding away from aircraft. Bowles et al. (1990) concluded that the economic loss is small; however, the concerns about damage effects are political in nature. Large effects might be noted in cases where animals were previously stressed, such as by long periods of adverse weather conditions, or poor management practices, or by genetic predisposition. In these cases, it is very difficult to separate what effect may be attributed to the pre-stressor and what may be attributed to aircraft activity per se (Bowles et al. 1990).

Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including a startle response, alerting, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. A startle response is a sequence of physiological and behavioral events that once helped animals avoid predators (Bowles et al. 1990). Because large, domestic animals normally control their movements even when frightened, and because they habituate quickly to aircraft noise (even to the noise of low-altitude, high-speed aircraft overflights), panic-related responses are rare. They are most common in horses and least common in dairy cattle, which are exposed to frequent human disturbance and are bred for docility. Some studies have reported primary and secondary effects of chronic exposure, including reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the literature. Effects on weight gain, milk yield, productivity, and fertility are either nonexistent based on current information or undocumented, although they are frequently the subject of public debate (Bowles et al. 1990).

Some reviewers have indicated that earlier studies and claims by farmers linking adverse effects of aircraft noise on livestock did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). Many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals (Air Force 1994).

Cattle. In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the Air Force prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry), and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies, but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that two of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (Air Force 1994). A similar study reported that abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (Air Force 1994). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (Air Force 1994).

A majority of the studies reviewed suggest that there is little or no effect of aircraft noise on cattle. Studies documenting adverse effects on domestic animals have been limited. A number of studies (Parker and Bayley 1960; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic booms, it was determined that milk yields were not affected by jet aircraft noise. This was particularly evident in cows that had been previously exposed to jet aircraft noise.

One study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a one-year time period and found that none of the abortions were associated with aircraft disturbances (Air Force 1993). In 1987, a researcher contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level (AGL) at 400 knots by running less than 10 meters. They resumed normal activity within one minute (Air Force 1993). In 1983, another researcher found that helicopters caused more reaction than other low-level aircraft overflights (Air Force 1994). A 1964 study also found that helicopters flying 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers (Air Force 1994).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or have their pregnancies disrupted after being overflown by 79 low-altitude helicopter flights and four low-altitude, subsonic jet aircraft flights (Air Force 1994). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (Air Force 1994).

In a report to Congress, the U.S. Forest Service (USFS) concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (USFS 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses. Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that some horses galloped in response to jet flyovers (Air Force 1993). Strong reactions were observed, but no injuries sustained, when pregnant horses were exposed to very low-altitude aircraft overflights (50 meters or lower, most flights with sound levels over 95 dBA) and helicopters hovering 20 meters overhead (Air Force 1994). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success.

LeBlanc et al. (1991) studied the effects of simulated aircraft noise over 100 dBA and visual stimuli on pregnant mares shortly before parturition. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. Levels of anxiety and mass body movements were the highest after initial exposure, but no horses injured themselves or their fetuses. Intensities of responses decreased with continued exposures, indicating habituation. There were no differences in pregnancy success when compared to a control group. Interestingly, the mares in LeBlanc's study exposed to overflight noise only habituated much more rapidly than mares exposed to the visual stimulus from an overflight as well as the noise.

Swine. Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., six hours or 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond et al. (1963) demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to aircraft noise. Observations of heart rate increase were recorded and it was noted that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, long-term exposure of pigs to recorded aircraft noise at levels of 100 dB to 135 dB from weaning to slaughter had only minor effects on the rate of feed utilization, weight gain, food intake, and reproduction rates, and there were no injuries or inner ear changes observed (Manci et al. 1988; Gladwin et al. 1988).

Domestic Fowl. Effects of low-altitude overflights (below 1,000 feet) generally had negligible effects on domestic fowl (Air Force 1994). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of confined birds and birds not previously exposed are more likely to pile up in response to a noise stimulus (Air Force 1994). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (Air Force 1994). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dBA.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (Air Force 1994). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55 percent for panic reactions, 31 percent for decreased production, 6 percent for reduced hatchability, 6 percent for weight loss, and less than 1 percent for reduced fertility (Air Force 1994).

Turkeys. The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles et al. 1990). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the

experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause confined turkey flocks to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (Air Force 1994).

E.2.8.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Chronic exposures are rarely relevant to wildlife because high levels and sustained levels of human-made noise are rare outside urban areas or industrial facilities (Bowles 1995). Guidelines that protect human hearing can reasonably be expected to also protect terrestrial wildlife because they are based on studies of laboratory animals. Susceptibility varies with species, but models currently in use are conservative (Bowles 1995). Generally, species that live entirely below the surface of the water have received little study due to the fact they do not experience the same level of sound as terrestrial species (NPS 1994).

E.2.8.3 Mammals

Terrestrial Mammals. Sound levels above about 90 dB may be associated with a number of behaviors such as retreat from the sound source, freezing (becoming motionless), or a strong startle response (Manci et al. 1988). Studies of terrestrial mammals have shown that sustained exposure to noise levels of 120 dBA or more can damage mammals' hearing, and levels of 95 dBA can cause adverse physiological changes (Manci et al. 1988).

It has been speculated that repeated aircraft overflight (e.g., surveillance flights along a pipeline) could affect large carnivores such as grizzly bears by causing changes in home ranges, foraging patterns, and breeding behavior (Dufour 1980). However, these possible effects have not been borne out in subsequent studies. Although wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980). A literature review by Larkin et al. (1996) determined that wolves were the least disturbed of any of the large mammals by low-level overflights. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters indicated a stronger reaction to helicopters than to fixed-wing aircraft, and that wolves were less disturbed by helicopters than were wild ungulates, while individual grizzly bears showed the greatest response of any animal species observed (Larkin et al. 1996; Manci et al. 1988); although response to overflight by grizzly bears varied from individual to individual (Dufour 1980).

Wild ungulates (such as American bison, caribou, bighorn sheep) appear to be more sensitive to noise disturbance than domestic livestock (Manci et al. 1988; Weisenberger et al. 1996; Bleich et al. 1990, 1994; White et al. 1993). Behavioral reactions may be related to the past history of exposure to such things as humans and aircraft. Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate responses to disturbance may be nervous behaviors, such as trotting a short distance. Escape behavior would represent a typical severe response, but it is rarely observed in response to overflight above 500 feet AGL that does not include circling.

Both the visual aspect and peak noise level (L_{pk}) of overflights diminish rapidly with increasing altitude of overflight. Similarly, wildlife responses diminish with increasing altitude of overflight (or increasing slant distance, which is a combination of aircraft height AGL and the horizontal distance from the animal

for an aircraft not directly overhead). A National Park Service study (Anderson and Horonjeff 1992) described the relationship between increasing altitude or slant distances and diminution of sound levels. Very large reductions in sound levels (on the order of 15 to 25 dB) are experienced as altitude or slant distance increases from 125 feet to 1,000 feet. Increases from 1,000 to 2,000 feet altitude would produce smaller but still moderate to substantial reductions (on the order of 4 to 8 dB). Between 2,000 and 7,000 feet AGL, 1,000-foot increases in distance produce considerably smaller reductions in sound levels (on the order of 3 to 5 dB), and above 7,000 feet AGL, each 1,000-foot increase in altitude results in only very small reductions in sound level (Anderson and Horonjeff 1992).

Reported wildlife responses to overflight are largely behavioral and short-term. Some short-term physiological changes (e.g., increased heart rate) have also been measured. Andersen et al. (1996) studied the response of radio-collared moose to large-scale ground and aerial military training exercises. They found temporary increases in heart rate that returned to normal soon (within 10 to 20 minutes or less) after the exposure. Animal flight responses were greater in response to approach by humans than to approach by equipment, including aircraft, possibly due to perception of humans as predators. Overflight of F-16 jets flying at 150 meters AGL (less than 500 feet AGL) did not elicit any heart rate or activity response from a moose, while skiers and walkers were flushing moose at approach distances of 200 to 400 meters (650 to 1,300 feet). Home ranges were temporarily displaced approximately 1.4 kilometers during the exercises, which involved 6,000 personnel, several hundred pieces of mechanized equipment including battle tanks and all-terrain vehicles (ATVs), a squadron of transport helicopters, and four jet fighter squadrons. Larkin et al. (1996) found that moose showed a much greater indifference to aircraft than caribou, and this was equally true of animals encountered in the open or in partial cover. Moose that reacted by running from the aircraft were in most cases cows with young calves.

It has been shown that exposure to low-altitude overflights can also result in increased heart rates in mule deer, elk, and bighorn sheep. Weisenberger et al. (1996) measured the heart rate responses of captive bighorn sheep (*Ovis canadensis*) and mule deer (*Odocoileus hemionus*) to simulated aircraft noise ranging from 92 to 112 dB. For both species, heart rates increased following the simulated aircraft noise, but returned to normal levels within 60–180 seconds. Behavioral responses were relatively rare, and the animals returned to normal behavior within four to five minutes. Furthermore, the animals exhibited decreased responses to increased exposure, suggesting habituation. A study reported possible effects on bighorn sheep energetic reserves through changes in food intake when helicopters were within 500 meters of animals (Bowles 1995). Authors observed that bighorn sheep alerted more while eating in the presence of helicopters than when undisturbed. They concluded that frequent alerting affected food intake. Krausman et al. (1998) studied the response of bighorn sheep in a 790-acre enclosure to frequent F-16 overflights at 395 feet AGL. Heart rates increased above preflight level during 7 percent of the overflights but returned to normal within 120 seconds. No behavioral response by the bighorn sheep was observed during the overflights.

Lawler et al. (2004) reported on a study of the effects of military jet overflights on Dall sheep (*Ovis dalli*) under the Yukon 1 and 2 Military Operations Areas (MOAs) in Alaska. The study could find no difference in population trends, productivity, survival rates, behavior, or habitat use between areas mitigated and not mitigated for low-level military aircraft (Air Force 1997). In the mitigated area of the Yukon MOAs, flights are restricted to above 5,000 feet AGL during the lambing season. In their wildlife best management practice (BMP) recommendations, Churchill and Holland (2003) suggest for bighorn and stone sheep (*Ovis dalli stonei*) that chronic aircraft exposure reduces foraging efficiency and habitat utilization and can impact growth and survival. They recommend limiting helicopter and fixed-wing aircraft to above 1,312 feet (400 meters) AGL and 6,562 feet (2,000 meters) horizontal distance from all sheep habitats, with no circling and no direct approaches.

A study of barren ground caribou (*Rangifer tarandus granti*) in Alaska documented only mild short-term behavioral reactions of caribou to military overflights in the Yukon MOAs (Lawler et al. 2005). A large

portion of the Fortymile Caribou Herd calves underneath the Yukon MOAs. Lawler et al. (2005) concluded that military overflights did not cause any calf deaths, nor did cow-calf pairs exhibit increased movement in response to the overflights. Maier et al. (1998) found that cow-calf pairs of the Delta Caribou Herd exposed to low-altitude overflights in existing MOAs moved about 2.5 kilometers more per day than those not exposed (Maier et al. 1998). Other studies found that post-calving caribou were more sensitive to the effects of aircraft noise disturbance than other environmentally stressed caribou (e.g., during low forage productivity years, winter or insect seasons) (White et al. 1993; Wolfe et al. 2000). However, given the low energy costs of observable behavioral responses, the instantaneous energy cost is minimal and would not measurably increase the daily energy expenditure even if animals were overflown repeatedly (White et al. 1993; Reimers and Colman 2006). White et al. (1993) found that caribou responded to increasing simulated daily sound doses from low-flying military jets with linear increases in activity, daily energy costs, and metabolic rates, and that the response was statistically significant for post-calving females, but increases were small and they projected no biologically significant decrease in fecundity or herd productivity. They nonetheless recommended that early post-calving caribou not be subjected to repeated low-altitude jet aircraft overflights because indirect, longer-term effects were unknown (White et al. 1993). Magoun et al. (2003) identified that maintaining a floor of 2,000 feet (625 meters) AGL for all military jet aircraft over caribou calving grounds would "eliminate most of the stronger-level reactions of caribou to military jet aircraft (startle reactions, trotting, and running) especially if speeds…did not exceed 500 knots between 2,000 feet AGL and 5,000 feet (1,562 meters) AGL." In their wildlife BMP recommendations, Churchill and Holland (2003) advise limiting helicopter and fixed-wing aircraft to above 1,312 feet (400 meters) AGL and 6,562 feet (2,000 meters) horizontal distance from birthing/rearing habitats.

Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet AGL or less. The reactions decreased with increased altitude of overflights, and for overflights higher than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups.

Using various aircraft and during several seasons, Murphy et al. (1993) found that instantaneous reactions of the Delta Caribou Herd to overflights were mild, seldom involved movement, and did not suggest that the animals were panicking or exhibiting predator response behaviors. They did observe that modifications of activity budgets, activity cycles, and daily movements were evident for caribou exposed to overflights. During post-calving, treatment animals traveled significantly farther than did control animals, and these results indicate that the presence of newborn calves in June may cause female caribou to respond more strongly to disturbance than at other times of the year. Also, F-15s, which were the loudest aircraft in the study, caused stronger reactions than did the other types of aircraft. They could not completely attribute the variability in duration of reactions or the distance moved in response to overflights to varying noise exposure alone, however. Reactions seemed to vary by the activity the animal was doing and by the individual. They attributed some of the individual variation in behavior to habituation and decided that caribou in that herd either have habituated or, at least, have had the opportunity to habituate to aircraft disturbance (Murphy et al. 1993). The increased movement observed during post-calving probably was of low energetic cost but may have moved the animals into suboptimal habitat or increased the chance of encountering a predator. This study also looked at how overflights altered caribou activity in different seasons and found time budgets during two of the three sampling periods were affected. During late winter, no differences in the activity budgets of caribou that had been recently overflown were detected, whereas differences were apparent during post-calving and the insect season, both seasons of overall increased activity levels (Murphy et al. 1993).

Although few studies have been conducted on the response of wild ungulates to sonic booms, these disturbances appear to have little to no adverse effect. Workman et al. (1992) studied the physiological and behavioral responses of captive pronghorn, elk (*Cervus elaphus*), and bighorn sheep to sonic booms. All three species exhibited an increase in heart rate lasting from 30 to 90 seconds in response to their first

exposure to a sonic boom. Behaviorally, the animals responded to their first exposure to a sonic boom by running a short distance (less than 30 feet reported for elk). After successive sonic booms, the heart-rate response decreased greatly and the animals remained alert, but did not run. The authors suggested the animals became habituated in response to successive exposures.

E.2.8.4 Birds

Auditory research conducted on birds indicates that they fall between reptiles and mammals relative to hearing sensitivity. According to Dooling (1978), within the range of 1,000 to 5,000 Hz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird auditory sensitivity falls off at a greater rate with increasing and decreasing frequencies. Observational evidence as well as studies examining aircraft-bird strikes indicate that birds routinely nest, roost, and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

E.2.8.5 Raptors

Considerable research attention has been paid to the potential adverse effects of aircraft overflight on raptors, given their habits of nesting and perching in elevated, exposed places such as cliff ledges and treetops, their status as high-level predators, and depressed population sizes of many species due to eggshell thinning and other metabolic effects related to exposure to pesticides through the food chain. There has been a concern that high-noise events (e.g., from a low-altitude aircraft overflight) may cause raptors to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis et al. 1991). Concerns have been expressed that these activities could impose an energy cost on the birds that, over the long term, could affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. For these concerns to be borne out, disturbance would need to be frequent enough for the energy costs to be cumulatively substantial and there would need to be a lack of habituation over time. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected by exposure to overflight (Grubb and King 1991; Ellis et al. 1991; Palmer et al. 2003; Andersen et al. 1989; Trimper et al. 1998).

In a literature review of raptor responses to aircraft overflight/noise, Manci et al. (1988) found that most raptors did not show a negative response to overflights. When negative responses were observed, they were predominantly associated with rotary-winged aircraft or jet aircraft that were repeatedly passing within 0.5 miles (0.8 kilometers) or less of a nest. Many raptor-aircraft studies have been conducted since then and several are reviewed below.

In Alaska, Palmer et al. (2003) found small differences in nest attendance and time-activity budgets between undisturbed nesting peregrine falcons (*Falco peregrinus*) and those that were overflown by military aircraft within 500 feet; however, the differences were not correlated with specific overflights nor did they affect reproductive success. Furthermore, Palmer et al. did not observe a difference in nest provisioning rates between disturbed and undisturbed nests.

Ellis et al. (1991) estimated the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on several nesting raptor species. No incidents of reproductive failure were observed, and site reoccupancy rates were high (95 percent) the following year. Overflights by military jet aircraft (mostly A-7 Corsair IIs and A-10 Thunderbolts) within 60 meters (195 feet) of the birds most often evoked only minimal behavioral response, although they occasionally caused birds to fly from perches or eyries (Ellis et al. 1991). Jet passes greater than 500 meters (1,625 feet) from the birds consistently failed to elicit significant responses. Several researchers found that ground-based activities,

such as operating chainsaws or an intruding human, were more disturbing to raptors than aircraft (White and Thurow 1985; Grubb and King 1991; Delaney et al. 1999). Red-tailed hawks (*Buteo jamaicensis*) and osprey (*Pandion haliaetus*) appeared to readily habituate to regular aircraft overflights (Andersen et al. 1989; Trimper et al. 1998).

Bald Eagle. The effects of aircraft overflight on the bald eagle (*Haliaeetus leucocephalus*) have been studied relatively well compared to most wildlife species. Bald eagle behavioral responses, varying from altering posture to taking flight and/or departing the area, have been associated with overflights of jets, helicopters, and light planes (Grubb and Bowerman 1997).

Overall, there have been no reports of reduced reproductive success or physiological risks to bald eagles exposed to aircraft overflights or other types of military noise and habituation behavior was observed in several studies (Fraser et al. 1985; Stalmaster and Kaiser 1997; Grubb and Bowerman 1997; Brown et al. 1999). Most researchers have documented that pedestrians and helicopters were more disturbing to bald eagles than fixed-wing aircraft, including military jets (Fraser et al. 1985; Grubb and King 1991; Grubb and Bowerman 1997). Recorded responses to 779 events involving military jet aircraft at median distances of 500 meters ranged from no response (67 percent), an alert posture (29 percent), taking flight (3 percent) or temporarily departing the immediate area (1 percent). Median approach distance for the few instances of eagles taking flight was 200 meters. There was considerably more reaction to helicopters than to jets or light planes (Grubb and King 1991; Grubb and Bowerman 1997). In their 1997 study, Grubb and Bowerman recommended a buffer of 1,968 feet (600 meters) around bald eagle nests for all aircraft during the breeding season.

One study of wintering bald eagles observed that 47 percent flushed when approached closer than 984 feet (300 meters) with Army helicopters; however, few eagles flushed in response to helicopter traffic staying over 300 meters in the same areas (Stalmaster and Kaiser 1997). The National Bald Eagle Management Guidelines recommend aircraft avoid overflights within 1,000 feet of nests during the breeding season, and that aircraft corridors are located no closer than 1,000 feet vertical or horizontal distance from communal roost sites (USFWS 2007).

Golden Eagle. In their guidelines for aerial surveys, USFWS (Pagel et al. 2010) summarized past studies by stating that most golden eagles respond to survey aircraft (fixed-wing and helicopters) by remaining on their nests, and continuing to incubate or roost. Surveys take place generally as close as 10 to 20 meters from cliffs (including hovering less than 30 seconds if necessary to count eggs) and no farther than 200 meters from cliffs depending on safety (Pagel et al. 2010).

Grubb et al. (2007) experimented with multiple exposures to two helicopter types and concluded that flights with a variety of approach distances (800, 400, 200, and 100 meters) had no effect on golden eagle nesting success or productivity rates within the same year, or on rates of renewed nesting activity the following year, when compared to the corresponding figures for the larger population of nonmanipulated nest sites (Grubb et al. 2007). They found no significant, detrimental, or disruptive responses in 303 helicopter passes near eagles. In 227 AH-64 Apache helicopter experimental passes (considered twice as loud as a civilian helicopter also tested) at test distances of 0–800 meters from nesting golden eagles, 96 percent resulted in no more response than watching the helicopter pass. No greater reactions occurred until after hatching when individual golden eagles exhibited five flattening and three flying behaviors at three nest sites. The flight responses occurred at approach distances of 200 meters or less. No evidence was found of an effect on subsequent nesting activity or success, despite many of the helicopter flights occurring during early courtship and nest repair, when fidelity to the nest site is weakest. None of these responding pairs failed to successfully fledge young, except for one nest that fell later in the season. Excited, startled, and avoidance reactions were never observed. Nonattending eagles or those perched away from the nests were more likely to fly than attending eagles, but also with less potential consequence to nesting success (Grubb et al. 2007). Golden eagles appeared to become less responsive with successive exposures. Grubb et al. (2007) suggest that much of helicopter sound energy may be at a lower frequency than golden eagles can hear, thus reducing expected impacts. Grubb et al. (2007) found no relationship between helicopter sound levels and corresponding eagle ambient behaviors or limited responses, which occurred throughout recorded test levels (76.7–108.8 dB, unweighted). The authors thought that the lower than expected behavioral responses may have been partially due to the fact that the golden eagles in the area appeared acclimated to the current high levels of outdoor recreational, including aviation, activities. Based on the results of this study, the authors recommended reduction of existing buffers around nest sites to 100 meters (325 feet) for helicopter activity.

Richardson and Miller (1997) reviewed buffers as protection for raptors against disturbance from ground-based human activities. No consideration of aircraft activity was included. They stressed a clear line of sight as an important factor in a raptor's response to a particular disturbance, with visual screening allowing a closer approach of humans without disturbing a raptor. A geographic information system (GIS)-assisted viewshed approach combined with a designated buffer zone distance was found to be an effective tool for reducing potential disturbance to golden eagles from ground-based activities (Richardson and Miller 1997). They summarized recommendations that included a median 0.5-mile (800-meter) buffer (range = 200–1,600 meters, n = 3) to reduce human disturbances (from ground-based activities such as rock climbing, shooting, vehicular activity) around active golden eagle nests from February 1 to August 1 based on an extensive review of other studies (Richardson and Miller 1997). Physical characteristics (i.e., screening by topography or vegetation) are important variables to consider when establishing buffer zones based on raptors' visual and auditory detection distances (Richardson and Miller 1997).

Osprey. A 1998 study by Trimper et al. in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets (a Canadian twin-engine jet attack aircraft similar to the F/A-18 Hornet used by the U.S. Navy and Marine Corps). Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult ospreys showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have become habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopters may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-Tailed Hawk. Andersen et al. (1989) investigated the effects of low-level helicopter overflights (0.3 miles [500 meters] AGL and below to 98 feet [30 meters] AGL) and habituation on red-tailed hawk nests at two Army installations. Naïve hawks (i.e., not previously exposed to helicopter flights) exhibited flushing at much greater distances (mean 100 meters) than did hawks at the same locations when overflights were repeated the next year (mean distance of 17 meters and 10 meters for the two installations). Flushing occurred at similar percentages of total nests both years. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level overflight, even during the nesting period.

E.2.8.6 Songbirds

The effect of overflight activity on songbirds has historically received little attention at least partially because most songbirds rely on concealment of nests in vegetation cover to avoid predation and are thus not exposed to the visual aspect of overflight. Additionally some species show a high tolerance to human presence, urban noise and disturbance.

Songbirds were observed to become silent prior to the onset of a sonic boom (F-111 jets), followed by “raucous discordant cries” for a few seconds. There was a return to normal singing within 10 seconds after the boom (Higgins 1974). The silence of the birds coincided with the arrival of a seismic signal propagated through the ground 4 to 8seconds prior to the audible boom. Ravens responded to sonic booms by emitting protestation calls, flapping their wings, and soaring, returning to normal behavior within a few minutes.

It has been observed that songbirds are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (USFS 1992). Data analyzed from 7 years found that military helicopter noise had no detectable influence on reproductive performance of the California gnatcatcher (a small songbird that is federally listed as threatened) on Naval Air Station Miramar and that nest success was equally likely in quiet and noisy areas (Hunsaker 2006). Hunsaker found that elevation, vegetation age class, and other habitat variables influenced nesting area choice more than the sound environment for this bird. A series of studies focused on busy multilane highways has indicated that road noise has a negative effect on bird populations (particularly during breeding) in a variety of species (Kaseloo 2005) that diminishes with distance from the highway. In contrast to noise from jet overflight, which is generally intermittent, noise from busy highways is nearly continuous, which magnifies adverse effects such as masking or interference with communication.

A study conducted cooperatively between the DoD and the USFWS assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater et al. 1999). The study did not address overflight except by helicopters. The findings suggested that the red-cockaded woodpecker can successfully acclimate to military noise events depending on the noise level. During noise events the birds responded by flushing from their nest cavities, increasing flushes proportionately with closer noise sources. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

E.2.8.7 Waterbirds

In their review, Manci et al. (1988) noted that aircraft can be particularly disturbing to waterfowl. The USFWS *Waterfowl Management Handbook* (Korschgen and Dahlgren 1992) lists "loud noise" as caused by aircraft as the top disturbance category for waterfowl. Overflight visual aspects may be more important (Owen 1973 in Dahlgren and Korschgen 1992). Eagles and other natural disturbances, boats, and hunting interrupted waterfowl behavior in greater percentages than aircraft (Ward et al. 1994; Korschgen and Dahlgren 1992).

Studies of waterfowl responses to overflight have shown (1) temporary behavior, including taking flight; (2) responses decreasing in magnitude as overflight elevation increases; and (3) rapid resumption of the behaviors exhibited prior to the overflight (e.g., Komenda-Zehnder et al. 2003). Helicopters generally create a greater response at a given altitude than do fixed-wing aircraft, including military jets (Ward et al. 1994). Several studies showed that migratory waterfowl (e.g., ducks and geese) expend more energy when exposed to repeated aircraft overflights, at least in the short term, which affects the birds' energy balance (Bowles 1995; Korschgen et al. 1985). Waterfowl are sensitive to disturbance because of their aggregation into large flocks during their molting and staging prior to migration. When at rest, the flocks are typically in waterbodies or wetlands exposed to the open sky and subject to aerial and ground predation. Taking flight is their defense against either types of predation. Waterfowl flocks seem to be as sensitive as their most responsive individual in the flock, so that larger flocks would have a greater chance of responding than small ones (Bowles 1995).

A variety of studies have indicated that migratory waterfowl exposed to overflights by aircraft and helicopters did not habituate to overflight (Bowles 1995; Komenda-Zehnder et al. 2003; Jensen 1990). However, most birds returned to normal behavior within several minutes after disturbance. Due to the danger to aircraft and aircrews posed by potential collisions with waterfowl and other flocking birds, the bird/wildlife-aircraft strike hazard (BASH) has received much attention by the military. BASH programs exist at every air installation and areas where low-level aircraft flight training takes place (e.g., MTRs), and have locations of seasonal concentrations of waterfowl identified and guidance for pilots with regard to elevational or lateral separation from these sites at specific seasons and times of day to avoid or minimize the potential for collision. This avoidance in turn reduces the potential for disturbance of migratory waterfowl concentrations by military aircraft overflight.

Conomy et al. (1998) suggested that responses of waterfowl to aircraft noise may be species-specific or differ by species groups (Komenda-Zehnder et al. 2003). Conomy et al. (1998) found that black ducks (*Anas rubripes*) exposed to noise under experimental conditions were able to habituate to aircraft noise, while wood ducks (*Aix sponsa*) were not. Black ducks exhibited a significant decrease in startle response to actual and simulated jet aircraft noise over a 17-day period, but wood duck response did not decrease uniformly following initial exposure. Some bird species appear to be more sensitive to aircraft noise at different times of the year.

Many waterfowl studies have involved brant (*Branta bernicla*), primarily during staging or molting periods, and their sensitivity to disturbance. The Alaska molt period is from June through August, and sources of stress that cause a temporal disruption of normal foraging activity could result in abnormal or incomplete molt (Taylor 1993). On an autumn staging ground in Alaska (i.e., prior to fall migration), 75 percent of brant and only 9 percent of Canada geese (*Branta canadensis*) flew in response to aircraft overflights of several types of commercial fixed-wing and rotary-wing aircraft for 356 overflights over 4 years (Ward et al. 1999).

Experiments with helicopter overflights found that disturbance-related behavioral responses by brant are greatest within 984 to 1,968 feet (300–600 meters) altitude range and aircraft would have to fly above 3,510 feet (1,070 meters) to have no significant effect on brant (Jensen 1990). Miller et al. (1994) used a simulation model designed to study the effects of helicopter disturbance on behavioral and energetic response of molting brant in Alaska and found that flying above 2,493 feet (760 meters) in a Bell 206 or 3,002 feet (915 meters) in a Bell 412 along any flight line would greatly reduce aircraft impacts. The disturbance distances given in the literature indicate that birds can be more sensitive in undisturbed regions, in very high concentrations, when molting, or when breeding in colonies (Komenda-Zehnder et al. 2003). The latter researchers found that overflights of wintering waterbirds at a very high speed, such as of military jets, are less disturbing than overflights at slower speeds. Ward et al. (1999) suggested that lateral distance, independent of aircraft type or noise, between aircraft and flock was the most important parameter in predicting response to overflights; they recommended aircraft travel greater than a mile (1.6 kilometers) from the shoreline of the lagoon they studied. Although mean response of brant and Canada geese generally was inversely proportional to aircraft altitude, there was a greater response to aircraft at 1,000 to 2,500 feet AGL than at lower or higher altitudes (Ward et al. 1999). Ward et al. (2000) speculate that the anomalous response was due to reduction of noise transmission from low-flying aircraft to the ground resulting from upward deflection of sound caused by typically windy conditions at the site.

Snow geese (*Chen caerulescens*) were more easily disturbed by aircraft prior to fall migration than at the beginning of the nesting season (Belanger and Bedard 1989). High levels of disturbance may have harmful energetic consequences on fall staging snow geese (Belanger and Bedard 1990). More than two disturbances per hour that cause the birds to leave a feeding area and return to a roost may cause an energy deficit that no behavioral compensatory mechanism (e.g., night feeding) can counterbalance.

The USFWS recommends avoidance of low-level flights below 1,600 feet AGL during the nesting and post-nesting molt of adult waterfowl (April 15 through August 1) over large river systems used by nesting ducks, geese, and swans.

Black et al. (1984) studied the effects of low-altitude (primarily over 500 feet AGL) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four F-16 aircraft and occurred once or twice per day. This study concluded that the reproductive activity—including nest success, nestling survival, and nestling chronology—was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology.

Kushlan (1979) did not observe any negative effects on wading bird colonies (i.e., rookeries) when circling fixed-wing aircraft conducted surveys within 200 feet AGL; 90 percent of the 220 observations indicated no reactions to overflight or heads turning from the birds. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1979). Apparently, nonnesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Colony distribution of wading birds appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to MTRs. These results suggest that presence of wading bird species was most closely linked to habitat availability and that they were not affected by low-level military overflights (Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance in two New Jersey estuaries and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach).

Burger (1981) also studied the effects of overflight noise from John F. Kennedy Airport in New York on herring gulls (*Larus argentatus*) that nested less than 1 kilometer from the airport. The study compared the response of the birds to overflight by conventional subsonic jetliners (Boeing 707, 727, 747) and the supersonic Concorde, a passenger jet formerly used for supersonic transatlantic flight that was well-known for the noise and vibration produced on takeoff and landing approach when flying subsonically. Noise levels over the nesting colony were recorded as 85 to 100 dBA on approach and 94 to 105 dBA on takeoff for most aircraft, including conventional jetliners. Generally, there did not appear to be any adverse effects of takeoff and landing noise on nesting birds caused by conventional jetliners. No sonic booms were heard in this study because flight in the vicinity of the airport was all subsonic. However, birds flushed when a Concorde flew directly overhead (producing 116 dBA sound and ground vibrations) and birds engaged in significantly more aggressive behavior once they returned to the colony compared with the normal conditions, including breaking eggs. The adverse response was attributed to fighting among birds from neighboring territories returning to the nesting colony after being simultaneously flushed when the Concorde flew overhead. Groups of gulls tended to loaf in the area of the nesting colony, and these resting birds were not disturbed when conventional jetliners flew overhead but all took flight when the Concorde flew overhead, which occurred only once or twice daily (Burger 1981).

Few studies show responses of waterbirds to sonic booms. One widely cited report discussed by Manci et al. (1988) was inconclusive regarding the cause of the reproductive failure of a colony of sooty terns (*Sterna fuscata*) on the Dry Tortugas in 1969 as to whether behavioral response of adults to sonic booms from extremely low-flying military jets (less than 100 meters AGL) or overgrowth of island vegetation were causal factors (Gladwin et al. 1988). Actions were taken to curb planes breaking the sound barrier within range of the Tortugas, and much of the excess vegetation was cleared. In mid-May 1970, the birds appeared to be having a normal nesting season. Laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles et al. 1991; Bowles et al. 1994; Cogger and Zegarra 1980) failed to show adverse effects on the hatching of eggs. A structural analysis (Ting et al. 2002) showed that even under extraordinary circumstances, sonic booms would not damage an avian egg.

E.2.8.8 Fish

The effects of overflight noise on fish have not received extensive study, but conclusions regarding their expected responses have involved inference based upon known physiologies and behavioral traits of these taxa (Gladwin et al. 1988). Transmission of sound from air to water takes place under limited conditions but sound is conducted very efficiently in water. Most of the literature on fish hearing relates to intense impulse sounds generated in the water (e.g., from pile driving) which has limited applicability to sound generated by aircraft overflight. Variables affecting what noise levels the new MOAs will experience include the type of aircraft, altitude, speed, and power level in addition to the characteristics of the water surface and amount of background noise present in the aquatic environment.

Fish in their native habitat would not be affected at the sound levels associated with military aircraft overflight as low as 500 feet AGL. Salmon are hearing generalists with their best hearing sensitivity at low frequencies (below 300 Hz) where they can detect particle motion induced by low frequency sound at high intensities (Amoser and Ladich 2005; Popper and Hastings 2009). The sound intensity required for salmon hearing is not approached by projected in-water sound levels associated with military jet overflight. Studies of Atlantic salmon conclude that they are unlikely to detect sounds originating in air (Hawkins and Johnstone 1978). This is partially attributable to the limited transmission of sound from air into water, background noise in water, and limitations on fish hearing. The literature includes one study that looked specifically at trout and salmon eggs after exposure during a critical phase of development to a variety of simulated sonic boom overpressures similar to those produced by military airplanes. Comparisons with control groups of eggs spawned at the same time indicated that the sonic boom exposure caused no increase in egg or fish fry mortality (Rucker 1973).

E.2.9 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance one study suggests that wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the "startle" or "fright" response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

E.2.10 Property Values

There are a number of factors that affect property values, which makes predicting impacts difficult. Factors directly related to the property, such as size, improvements, and location of the property, as well as current conditions in the real estate market, interest rates, and housing sales in the area are more likely to have a direct adverse impact on property values. Several studies have analyzed property values as they relate to military and civilian aircraft noise. In one study, a regression analysis of property values as they relate to aircraft noise at two military installations was conducted (Fidell et al. 1996). This study found that, while aircraft noise at these installations may have had minor impacts on property values, it was difficult to quantify that impact. Other factors such, as the quality of the housing near the installations and the local real estate market, had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values of two comparable properties.

Another study analyzed 33 other studies attempting to quantify the impact of noise on property values (Nelson 2003). The result of the study supports the idea that the potential for an adverse impact on property values as a result of aircraft noise exists and estimates that the value of a specific property could be discounted between 0.5 and 0.6 percent per decibel when compared to a similar property that is not impacted by aircraft noise. Additional data indicates that the discount for property values as a result of noise would be higher for noise levels above 75 dB DNL.

E.2.11 Noise Effects on Structures

E.2.11.1 Subsonic Aircraft Noise

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (CHABA 1977). A study directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or “rattle,” of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

E.2.11.2 Sonic Booms

Sonic booms are commonly associated with structural damage. Most damage claims are for brittle objects, such as glass and plaster. Table E-8 summarizes the threshold of damage that might be expected at various overpressures. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure. Breakage data for glass, for example, spans a range of two to three orders of magnitude at a given overpressure. At 1 psf, the probability of a window breaking ranges from one in a billion (Sutherland 1989) to one in a million (Hershey and Higgins 1976). These damage rates are associated with a combination of boom load and glass condition. At 10 psf, the probability of breakage is between one in a hundred and one in a thousand. Laboratory tests of glass (White 1972) have shown that properly installed window glass will not break at overpressures below 10 psf, even when subjected to repeated booms, but in the real world glass is not in pristine condition.

Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it will often crack due to shrinkage while curing, or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high from these factors.

Some degree of damage to glass and plaster should thus be expected whenever there are sonic booms, but usually at the low rates noted above. In general, structural damage from sonic booms should be expected only for overpressures above 10 psf.

Table E-8. Possible Damage to Structures From Sonic Booms

Sonic Boom Overpressure Nominal (psf)	Type of Damage	Item Affected
0.5 - 2	Plaster	Fine cracks; extension of existing cracks; more in ceilings; over door frames; between some plaster boards.
	Glass	Rarely shattered; either partial or extension of existing.
	Roof	Slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	Failures show that would have been difficult to forecast in terms of their existing localized condition. Nominally in good condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in nominally good state, slurry-wash; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.
	Walls (in)	Inside ("party") walls known to move at 10 psf.
Greater than 10	Glass	Some good glass will fail regularly to sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plaster boards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989.

E.2.12 Noise Effects on Structure and Terrain

E.2.12.1 Subsonic Aircraft Noise

Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such

effects, and it is considered improbable that such effects will result from routine, subsonic aircraft operations.

E.2.12.2 Sonic Booms

In contrast to subsonic noise, sonic booms are considered to be a potential trigger for snow avalanches. Avalanches are highly dependent on the physical status of the snow, and do occur spontaneously. They can be triggered by minor disturbances, and there are documented accounts of sonic booms triggering avalanches. Switzerland routinely restricts supersonic flight during avalanche season. Landslides are not an issue for sonic booms. There was one anecdotal report of a minor landslide from a sonic boom generated by the Space Shuttle during landing, but there is no credible mechanism or consistent pattern of reports.

E.2.12.3 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Most scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on standing architecture. For example, the FAA published a study of potential impacts resulting from vibrations caused by the noise of subsonic Concorde overflights on five historic properties, including a restored plantation house, a stone bridge and tollhouse, and other structures (Hershey, Kevala, and Burns 1975). This study analyzed the breakage probabilities of structural elements that might be considered susceptible to vibration, such as window glass, mortar, and plaster. The results indicated that, with the exception of some already cracked window glass, there was no practical risk of noise-induced vibration damage to any of these structures.

Some studies of the effects of overflights—both subsonic and supersonic—on archaeological structures and other types of sites also have been published. Battis examined the effects of low-altitude overflights of B-52, RF-4C, and A-7 aircraft on standing walls at Long House Ruin in northeastern Arizona (Battis 1988). The motion levels observed during all passes were well below a conservative threshold for vibration in ancient structures, a level of 1.3 millimeters per second, established by two previous studies. Battis concluded that vibration associated with aircraft overflights at speeds and altitudes similar to those measured in his study had/would have no significant damaging effect on Long House and similar sites.

Two Air Force-sponsored studies have included research into potential effects of supersonic overflight on "nonstructural" archaeology and unconventional structures. One study included historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites and rock art, and seismically sensitive areas such as avalanche and mud/rock slide areas (Sutherland, Brown, and Goerner 1990). That study compared overpressure associated with different types of aircraft in supersonic flight at different altitudes with failure or damage stress values for these types of sites. The authors concluded that overpressures generated by supersonic overflight were well below established damage thresholds. Subsonic operations—which were not included in this study—would be even less likely to cause damage.

Battis also completed a study that examined the potential for damage by sonic booms to rock shelter and petroglyph sites located within the Valentine MOA in Texas (Battis 1983). The Texas State Historic Preservation Office helped design and participated in this study, which involved taking measurements at a rock shelter site and at a field of petroglyphs-bearing boulders during supersonic overflights. The peak overpressure for booms generated during supersonic operations over the Valentine MOA was 5.2 psf. The lower limit (the least amount of pressure needed) for damaging rock was measured in the laboratory at 2.1 × 104 psf, 4,000 times the peak overpressure measured during the study.

Air Force National Environment Policy Act documents have examined the potential impacts on historic properties that might result from subsonic and supersonic overflights. In 1995, the Air Force published the Environmental Assessment for Continued Supersonic Operations in the Black Mountain Supersonic Corridor and the Alpha/Precision Impact Range Area. Eligible and potentially eligible cultural resources in the area of potential effect include petroglyph and pictograph panels located on a variety of rock types, historic adobe and non-adobe structures with standing walls, and historic mines (which contain tunnels) and wells. The report concludes that supersonic low-altitude flights have occurred over these corridors for 25 years or more and have resulted in no significant impacts on cultural resources. The California SHPO agreed, and during National Historic Preservation Act Section 106 review of this undertaking, concurred with the Air Force's finding that continued supersonic overflights would have no effect on historic properties.

As noted above for the noise effects of noise-induced vibrations on normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

E.3 NOISE MODELING

E.3.1 Subsonic Aircraft Noise

An aircraft in subsonic flight generally emits noise from two sources: the engines and flow noise around the airframe. Noise generation mechanisms are complex and, in practical models, the noise sources must be based on measured data. The Air Force has developed a series of computer models and aircraft noise databases for this purpose. The models include NOISEMAP (Moulton 1992) for noise around airbases, and MOA-Range NOISEMAP (MR_NMAP) (Lucas and Calamia 1996) for use in MOAs, ranges, and low-level training routes. These models use the NOISEFILE database developed by the Air Force. NOISEFILE data includes SEL and L_{max} as a function of speed and power setting for aircraft in straight flight.

Noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its trajectory. The models noted above divide the trajectory into segments whose noise can be computed from the data in NOISEFILE. The contributions from these segments are summed.

MR_NMAP was used to compute noise levels in the airspace. The primary noise metric computed by MR_NMAP was Ldnmr averaged over each airspace. Supporting routines from NOISEMAP were used to calculate SEL and L_{max} for various flight altitudes and lateral offsets from a ground receiver position. Sound intensity at a point on the ground, is also affected by several environmental factors, such as, atmospheric conditions and properties of the terrain being overflown.

E.3.2 Sonic Booms

When an aircraft moves through the air, it pushes the air out of its way. At subsonic speeds, the displaced air forms a pressure wave that disperses rapidly. At supersonic speeds, the aircraft is moving too quickly for the wave to disperse, so it remains as a coherent wave. This wave is a sonic boom. When heard at the ground, a sonic boom consists of two shock waves (one associated with the forward part of the aircraft, the other with the rear part) of approximately equal strength and (for fighter aircraft) separated by 100 to 200 milliseconds. When plotted, this pair of shock waves and the expanding flow between them have the appearance of a capital letter "N," so a sonic boom pressure wave is usually called an "N-wave." An N-wave has a characteristic "bang-bang" sound that can be startling. Figure E-7 shows the generation and evolution of a sonic boom N-wave under the aircraft. Figure E-8 shows the sonic boom pattern for an

aircraft in steady supersonic flight. The boom forms a cone that is said to sweep out a "carpet" under the flight track.

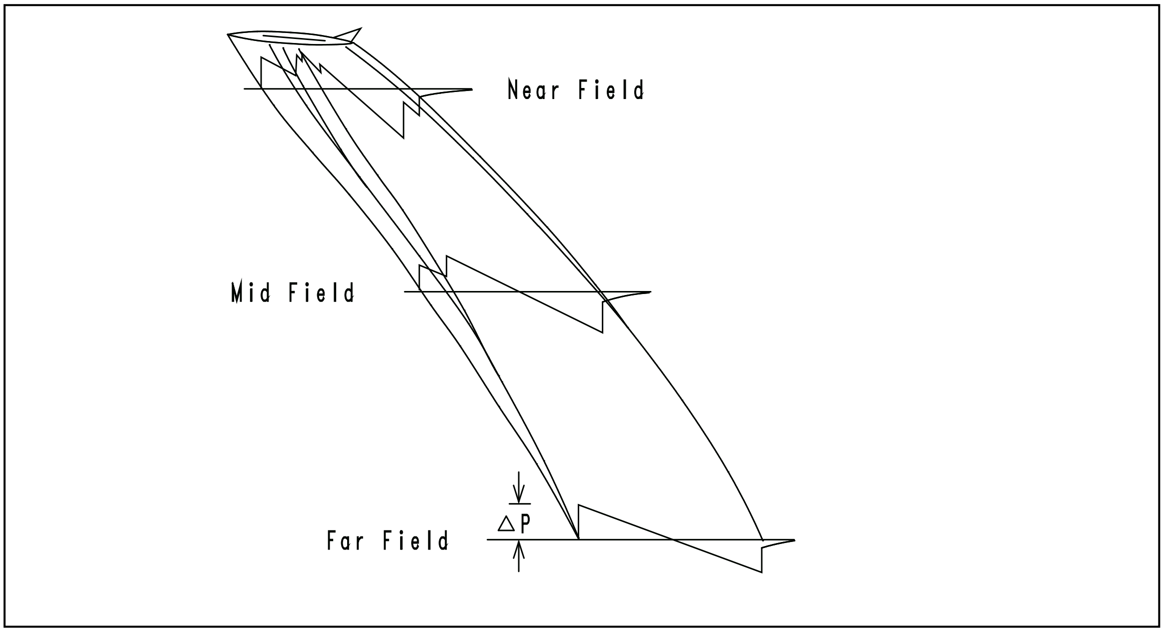


Figure E-7. Sonic Boom Generation and Evolution to N-Wave

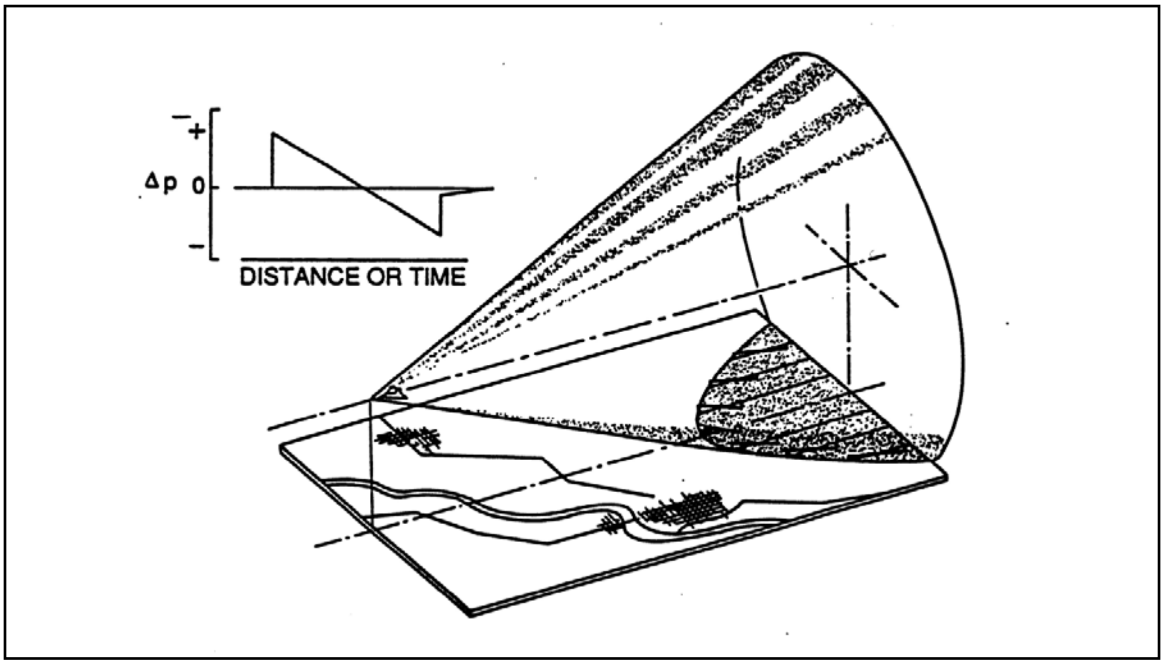


Figure E-8. Sonic Boom Carpet in Steady Flight

The complete ground pattern of a sonic boom depends on the size, shape, speed, and trajectory of the aircraft. Even for a nominally steady mission, the aircraft must accelerate to supersonic speed at the start, decelerate back to subsonic speed at the end, and usually change altitude. Figure E-9 illustrates the complexity of a nominal full mission.

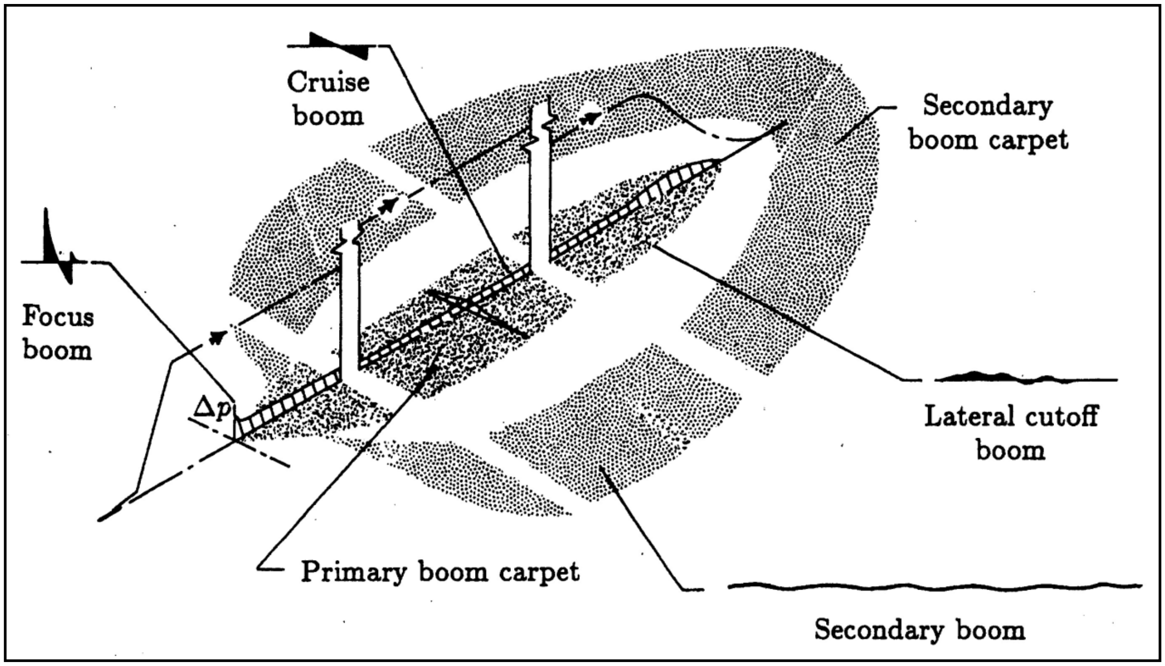


Figure E-9. Complex Sonic Boom Pattern for Full Mission

The Air Force's PCBoom4 computer program (Plotkin and Grandi 2002) can be used to compute the complete sonic boom footprint for a given single event, accounting for details of a particular maneuver.

Supersonic operations for the proposed action and alternatives are, however, associated with air combat training, which cannot be described in the deterministic manner that PCBoom4 requires. Supersonic events occur as aircraft approach an engagement, break at the end, and maneuver for advantage during the engagement. Long time cumulative sonic boom exposure, CDNL, is meaningful for this kind of environment.

Long-term sonic boom measurement projects have been conducted in four supersonic air combat training airspaces: White Sands, New Mexico (Plotkin et al. 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin et al. 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton et al. 1993); and the western portion of the Goldwater Range (Page et al. 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data and supported development of the 1992 BOOMAP model (Plotkin et al. 1992). The current version of BOOMAP (Frampton et al. 1993, Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for such variables as maneuvers, statistical variations in operations, atmosphere effects, and other factors.

Figure E-10 shows a sample of supersonic flight tracks measured in the air combat training airspace at White Sands (Plotkin et al. 1989). The tracks fall into an elliptical pattern aligned with preferred engagement directions in the airspace. Figure E-11 shows the CDNL contours that were fit to six months of measured booms in that airspace. The subsequent measurement programs refined the fit, and demonstrated that the elliptical maneuver area is related to the size and shape of the airspace (Frampton et al. 1993). BOOMAP quantifies the size and shape of CDNL contours, and also numbers of booms per day, in air combat training airspaces. That model was used for prediction of cumulative sonic boom exposure in this analysis.

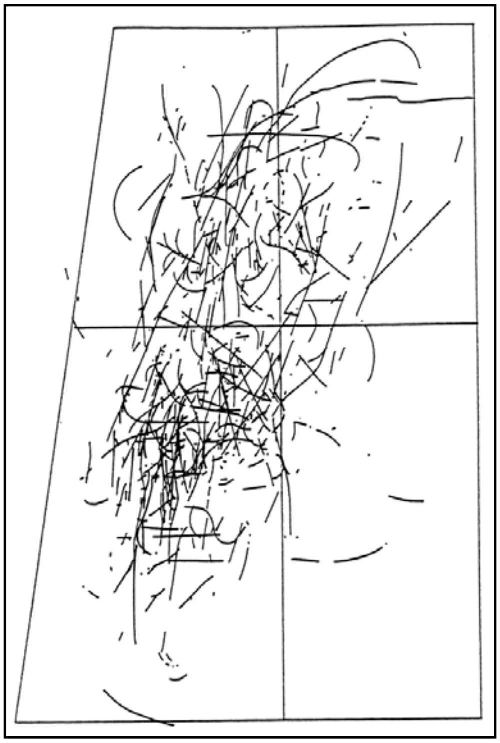


Figure E-10. Supersonic Flight Tracks in Supersonic Air Combat Training Airspace

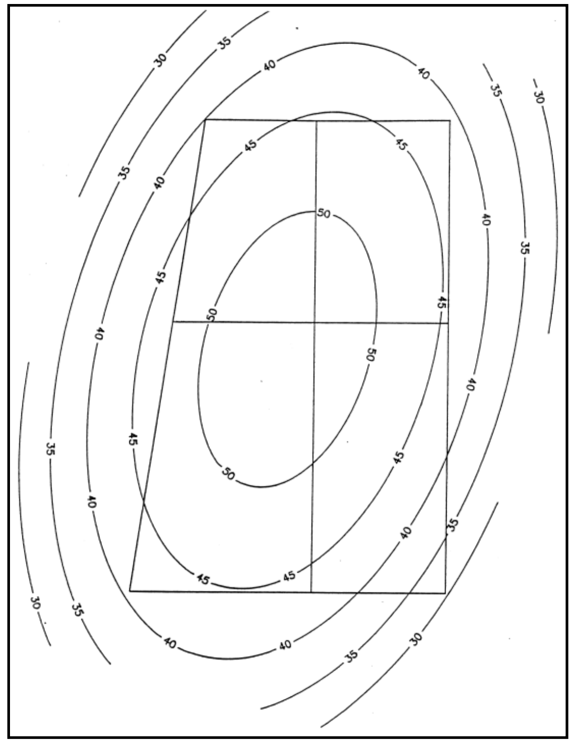


Figure E-11. Elliptical CDNL Contours in Supersonic Air Combat Training Airspace

E.3.3 Munitions Noise

The programs BNOISE2 and Small Arms Range Noise Assessment Model (SARNAM) calculate noise levels generated by large arms and small arms, respectively. Large arms are defined as being weapons firing rounds 20 mm or larger, while small arms are defined as weapons firing projectiles less than 20 mm in diameter. Both BNOISE2 and SARNAM calculate munitions noise based on recorded noise levels for several weapon and projectile types using a series of noise propagation algorithms. Calculations include the muzzle blast as well as the shockwave generated by the projectile, which often travels at faster than the speed of sound. The programs are capable of generating several noise metrics including CDNL and peak noise level.

E.4 LARGE ARMS MUNITIONS NOISE MODELING AT JPARC RANGES

The BNOISE2 noise model was used to assess large arms munitions noise levels at the DTA and YTA under baseline conditions and under several action alternatives. Munitions usage data used in noise modeling are listed in Table E-9 and Table E-10 for Donnelly Training Area/R-2202 and Yukon Training Area/R-2205, respectively. Table E-9 and Table E-10 first list numbers of round fired annually under representative baseline conditions and then list numbers of rounds that would be fired annually under action alternatives.

Representative baseline munitions data are based on reported 2010 Army and Air Force munitions usage as adjusted to reflect expected growth if no further actions are taken. The baseline numbers reflect an expected increase in the number of annual Red Flag exercises to six, the number proposed in the Alaska MOA EIS (Air Force 1997). The tables below also reflect a conservative estimate of increased munitions usage by Army units once all unit beddown actions are complete.

Table E-9. Munitions Usage at DTA Under Baseline Conditions and Action Alternatives

Donnelly Training Area/R-2202 Noise Modeling Inputs			Baseline		BAX Restricted Area – Alternatives A and B		RLOD – Alternatives A and B
			Rounds used in the DTA	Rounds used in the BAX	Rounds used in the DTA	Rounds used in the BAX	Rounds used in R-2202
Air-to-Ground	Cannon	20 mm (IN)	3,388	0	0	3,388	3,388
		20 mm (HE)	9,788	0	9,788	0	9,788
		25 mm (IN)	0	0	0	0	0
		25 mm (HE)	4,788	0	4,788	0	4,788
		30 mm (IN)	0	0	0	1600	0
		30 mm (HE)	22,063	0	22,063	0	22,063
	Missile/ Rocket	2.75” FFAR (IN)	99	0	99	0	99
		2.75” FFAR (HE)	244	0	4	240	244
		AGM-65 (HE)	60	0	60	0	60
		AGM-65 (IN)	26	0	8	18	26
	Inert Bombs	BDU-33 (45 lb)	334	0	334	0	334
		BDU-45 (500 lb)	64	0	64	0	64
		BDU-50 (500 lb)	150	0	150	0	150
		BDU-56 (2,000 lb)	113	0	113	0	113
		GBU-10 (2,000 lb)	123	0	123	0	123
		GBU-12 (500 lb)	76	0	76	0	76
		GBU-16 (1,000 lb)	44	0	44	0	44
		GBU-24 (2,000 lb)	49	0	49	0	49
		GBU-30 (500 lb)	1	0	1	0	1
		GBU-31 (2,000 lb)	40	0	40	0	40
		GBU-32 (1,000 lb)	26	0	26	0	26
		GBU-38 (500 lb)	125	0	125	0	125
		Mark-83 (1,000 lb)	9	0	9	0	9
Air-to-Ground (Continued)	Live Bombs	SDB (250 lb)	200	0	200	0	200
		GBU-12 (500 lb)	76	0	76	0	76
		GBU-31 (2,000 lb)	25	0	25	0	25
		GBU-32 (1,000 lb)	70	0	70	0	200
		GBU-38 (500 lb)	38	0	38	0	38
		Mark-82 (500 lb)	243	0	243	0	243
		Mark-83 (1,000 lb)	125	0	125	0	125
		Mark-84 (2,000 lb)	40	0	40	0	40
Ground-to-Ground	Mortars	60 mm (IN)	922	0	135	787	922
		60 mm (HE)	486	0	486	0	486
		81 mm (IN)	459	0	0	459	459
		81 mm (HE)	218	0	218	0	218
		120 mm (IN)	1,197	0	48	1,149	1,197
		120 mm (HE)	779	0	779	0	779
	Artillery	105 mm (IN)	161	0	0	161	161
		105 mm (HE)	2,635	0	2,635	0	2,635
		155 mm (IN)	117	0	0	117	117
		155 mm (HE)	1,615	0	1,615	0	1,615
	Other	TOW missile (IN)	9	0	3	6	9
		AT4 rocket (HE)	50	0	50	0	50
		Dragon Missile (HE)	1	0	1	0	1
		MLRS (IN)	2	0	2	0	2
		Stryker 105 mm (IN)	502	3,186	502	3,186	3,688
		Abrams 120 mm (HE)	8	0	8	0	8
Explosive Charges	Black Powder	0.139 lb charge	1,617	0	1,617	0	1,617
		0.055 lb charge	16	0	16	0	16
		0.110 lb charge	330	0	330	0	330
		0.088 lb charge	1,044	0	1,044	0	1,044
	C-4	1.25 lb charge	2,012	0	2,012	0	2,012

Table E-10. Munitions Usage at YTA Under Baseline Conditions and Action Alternatives

Yukon Training Area/R-2205 Noise Modeling Inputs			Baseline		R-2205 Expansion – Alternative A	
			Rounds used in the YTA	Rounds used in the DMPTR	Rounds used in the YTA	Rounds used in the DMPTR
Air-to-Ground	Cannon	20 mm (IN)	9,144	0	0	9,144
		20 mm (HE)	23,113	0	23,113	0
		25 mm (IN)	750	0	225	525
		25 mm (HE)	75	0	75	0
		30 mm (IN)	28,950	0	5,675	23,275
		30 mm (HE)	4,300	0	4,300	0
	Missile/ Rocket	2.75" FFAR (IN)	1,540	0	462	1,078
		2.75" FFAR (HE)	118	0	118	0
		AGM-65 (HE)	0	0	0	0
		AGM-65 (IN)	0	0	0	0
Air-to-Ground (Continued)	Inert Bombs	BDU-33 (45 lb)	784	0	784	0
		BDU-45 (500 lb)	34	0	34	0
		BDU-50 (500 lb)	248	0	248	0
		BDU-56 (2,000 lb)	95	0	95	0
		GBU-10 (2,000 lb)	3	0	3	0
		GBU-12 (500 lb)	156	0	156	0
		GBU-16 (1,000 lb)	5	0	5	0
		GBU-24 (2,000 lb)	0	0	0	0
		GBU-30 (500 lb)	0	0	0	0
		GBU-31 (2,000 lb)	15	0	15	0
		GBU-32 (1,000 lb)	0	0	0	0
		GBU-38 (500 lb)	9	0	9	0
		Mark-83 (1,000 lb)	0	0	0	0
	Live Bombs	SDB (250 lb)	0	0	0	0
		GBU-12 (500 lb)	33	0	33	0
		GBU-31 (2,000 lb)	0	0	0	0
		GBU-32 (1,000 lb)	0	0	0	0
		GBU-38 (500 lb)	0	0	0	0
		Mark-82 (500 lb)	531	0	531	0
		Mark-83 (1,000 lb)	20	0	20	0
		Mark-84 (2,000 lb)	45	0	45	0
Ground-to-Ground	Mortars	60 mm (IN)	2,048	0	140	1,908
		60 mm (HE)	1,244	0	1,244	0
		81 mm (IN)	1,979	0	365	1,614
		81 mm (HE)	327	0	327	0
		120 mm (IN)	3,532	0	296	3,236
		120 mm (HE)	1,091	0	1,091	0
Ground-to-Ground, Cont'd	Artillery	105 mm (IN)	0	0	0	0
		105 mm (HE)	0	0	0	0
		155 mm (IN)	361	0	0	361
		155 mm (HE)	2,160	0	2,160	0
		165 mm M135 (HE)	89	0	89	0
	Other	TOW missile (IN)	0	0	0	0
		AT4 rocket (HE)	0	0	0	0
		Dragon Missile (HE)	0	0	0	0
		MLRS (IN)	0	0	0	0
		Stryker 105 mm (IN)	0	4,880	0	4,880
		Abrams 120 mm (HE)	187	0	187	0
		C-4 1.25 lb charge	180	0	180	0

Key: AGM=air-to-ground missile; BAX=battle area complex; BDU=bomb dummy unit; DMPTR=digital multipurpose training range; DTA=Donnelly Training Area; FFAR=folding fin aerial rocket; GBU=guided bomb unit; HE=high explosive; IN=inert; JCALF=joint combined arms live fire; lb=pounds; MLRS=multiple launch rocket system; mm-millimeter; RLOD=realistic live ordnance delivery; SDB=small diameter bomb; TOW=tube-launched, optically-tracked, wire command data link; YTA= Yukon Training Area

Table E-9 and Table E-10 list munitions usage for each action alternative that would alter the number or location of munitions firing. Under both BAX Restricted Area action alternatives, certain inert munitions types that had not been permitted under baseline conditions would now be permitted at the BAX because of the presence of restricted airspace. An estimated 70 percent of the baseline inert munitions used annually of those type newly permitted was modeled as shifting from DTA to the BAX under the BAX action alternatives. Under the RLOD action alternatives, the number of air-to-ground munitions used annually would increase relative to baseline conditions. Only inert munitions are permitted at Blair Lakes Range and therefore, under both RLOD action alternatives, all high-explosive munitions would be used at DTA. Under the proposal to expand R-2205, inert munitions types that had not been permitted at the DMPTR under baseline conditions would be permitted. Similar to the BAX Restricted Area proposal, an estimated 70 percent of baseline inert munitions used annually was modeled as shifting to the DMPTR from other YTA ranges.

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Appendix F
Air Quality

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ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Engineering and the Environment
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
lb/hr	pounds per hour
IPCC	Intergovernmental Panel on Climate Change
MOA	Military Operations Area
UAV	unmanned aerial vehicle

APPENDIX F
AIR QUALITY

F.1 FOX 3 MOA EXPANSION AND NEW PAXON MOA

Table F-1 shows the average sortie duration and altitude distribution for aircraft operating in the affected area of the Fox 3 Military Operations Area (MOA) expansion and new Paxon MOA action alternatives.

Table F-1. Altitude Distribution for Aircraft Operating in Affected Area of the Fox 3 MOA Expansion and New Paxon MOA Action

Aircraft Type	Altitude Distribution [1,2] (Typical Percentage of Sortie Duration Time – total 100%)						
	500–1,000 ft AGL	1,000–3,000 ft AGL	3,000–5,000 ft AGL	5,000–10,000 ft AGL	10,000 ft AGL–FL180	FL180 and above	Total Percentage of Time Below 3,000 ft
A-10	33	17	16	24	10	0	50
AV-8	4	2	3	5	26	60	6
B-1B	2	5	5	3	20	65	7
B-2	0	0	0	0	3	97	0
B-52	0	1	1	3	5	90	1
CH-47	20	27	28	25	0	0	47
C-130	28	15	15	22	20	–	43
C-17	10	12	13	30	23	12	22
E-3	0	0	0	0	0	100	0
E-767	0	0	0	0	0	100	0
F-15C	0	2	3	10	25	60	2
F-15E	5	1	0	10	25	50	6
F-15J	5	1	0	10	25	50	6
F-16	4	2	3	5	26	60	6
F-16CJ	4	2	3	5	26	60	6
F-22	5	2	3	5	10	75	7
GR1	5	2	3	12	28	50	7
HC-130	28	15	15	22	20	–	43
F-18	5	2	3	12	28	50	7
HH-60	20	27	28	25	0	0	47
KC-10	0	0	0	0	0	100	0
KC-130	0	0	0	0	0	100	0
KC-135R	0	0	0	0	0	100	0
KC-767	0	0	0	0	0	100	0
OH-58	20	27	28	25	0	0	47
UH-60	20	27	28	25	0	0	47

Key: AGL = above ground level; ft = feet

1. Shaded cells indicate that operations occurring at these altitudes do not impact ground-level concentrations and air quality.
2. Typical sortie duration in MOAs = 0.7 hours.

Table F-2 shows the emissions factors used to calculate emissions from aircraft operations below 3,000 feet associated with the Fox 3 MOA expansion and new Paxon MOA action alternatives.

Table F-2. Emission Factors and Operational Information for Aircraft that Operate Below 3,000 Feet in the Expanded Fox 3 and New Paxon MOAs

Aircraft	Engine Type	Number of Engines	Fuel Flow/ Engine (lb/hr)	Pounds/1000 Pounds Fuel								
				VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
A-10	TF34-GE-100/100A	2	1,776	0.40	4.08	5.96	1.80	0.27	0.24	3,130.43	0.10	0.09
AV-8	F402-RR-406A	1	8,094	0.43	6.93	10.78	1.80	0.32	0.29	3,130.43	0.10	0.09
B-1B	F101-GE-102	4	7,904	0.11	0.84	12.80	1.80	0.17	0.15	3,130.43	0.10	0.09
B-2	F118-GE-100	4	10,992	0.00	0.74	33.05	1.80	0.11	0.10	3,130.43	0.10	0.09
B-52	JT3D-3B	8	9,720	0.98	1.05	12.05	1.80	0.39	0.35	3,130.43	0.10	0.09
CH-47	T55-L-7C	2	1,736	0.16	2.56	7.43	1.80	0.16	0.14	3,130.43	0.10	0.09
C-130	T56-A-9	4	2,088	0.41	2.47	1.17	1.80	0.31	0.28	3,130.43	0.10	0.09
C-17	F117-PW-100	4	14,111	0.11	0.38	34.23	1.80	0.12	0.11	3,130.43	0.10	0.09
E-3	JT3D-3B	4	9,720	0.98	1.05	12.05	1.80	0.39	0.35	3,130.43	0.10	0.09
E-767	JT9D-70	2	16,182	N/A	N/A	N/A	N/A	N/A	N/A	3,130.43	0.10	0.09
F-15C	F100-PW-220	2	9,776	2.30	0.86	29.26	1.80	1.01	0.91	3,130.43	0.10	0.09
F-15E	F100-PW-229	2	11,601	0.40	0.40	57.52	1.80	0.38	0.34	3,130.43	0.10	0.09
F-15J	F100-PW-229	2	11,601	0.40	0.40	57.52	1.80	0.38	0.34	3,130.43	0.10	0.09
F-16	F100-PW-200	1	8,801	4.02	0.67	39.04	1.80	1.86	1.67	3,130.43	0.10	0.09
F-16CJ	F100-PW-200	1	8,801	4.02	0.67	39.04	1.80	1.86	1.67	3,130.43	0.10	0.09
F-22	F119-PW-1003	2	18,612	0.00	0.80	19.80	1.80	1.12	1.01	3,130.43	0.10	0.09
GR1	RB199-34R Mk 103	2	28,672	0.24	12.14	9.20	1.80	0.17	0.15	3,130.43	0.10	0.09
HC-130	T56-A-9	4	2,088	0.41	2.47	1.17	1.80	0.31	0.28	3,130.43	0.10	0.09
F-18	F404-GE-400	2	28,672	0.24	12.14	9.20	1.80	0.17	0.15	3,130.43	0.10	0.09
HH-60	T700-GE-401/401C	1	443	0.53	10.11	5.60	1.80	0.46	0.41	3,130.43	0.10	0.09
KC-10	F103-GE-100/101	3	19,929	0.62	0.50	36.46	1.80	0.41	0.37	3,130.43	0.10	0.09
KC-130	T56-A-9	4	2,088	N/A	N/A	N/A	N/A	N/A	N/A	3,130.43	0.10	0.09
KC-135R	F108-CF-100	4	6,521	N/A	N/A	N/A	N/A	N/A	N/A	3,130.43	0.10	0.09
KC-767	JT9D-70	2	16,182	N/A	N/A	N/A	N/A	N/A	N/A	3,130.43	0.10	0.09
OH-58	T700-GE-401/401C	1	443	0.53	10.11	5.60	1.80	0.46	0.41	3,130.43	0.10	0.09
UH-60	T700-GE-401/401C	1	443	0.53	10.11	5.60	1.80	0.46	0.41	3,130.43	0.10	0.09

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; lb/hr = pounds per hour; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. All engines are assumed to run at military power setting.

Table F-3 shows the baseline and proposed sortie data for Alternatives A and E of the Fox 3 MOA expansion and new Paxon MOA action.

Table F-3. Sortie Data for Alternatives A and E of the Fox 3 MOA Expansion and New Paxon MOA Action

Baseline Number of Sorties

Aircraft	Stony MOA	Fox 3 MOA[1]
A-1q0	0	645
AV-8	0	253
B-1B	0	1
B-2	0	54
B-52	0	113
CH-47	0	0
C-130	0	133
C-17	4	53
E-3	0	99
E-767	0	29
F-15C	539	688
F-15E	0	284
F-15J	0	219
F-16	0	3,599
F-16CJ	0	265
F-22	1,942	2,717
GR1	0	275
HC-130	0	0
F-18	11	106
HH-60	0	0
KC-10	0	1
KC-130	0	16
KC-135R	6	413
KC-767	0	24
OH-58	0	0
UH-60	0	0
Total	**2,502**	**9,987**

1. Fox 3 baseline sorties all occur over 3,000 feet.

Alternatives A and E Number of Sorties

Aircraft	Stony MOA	Fox 3 MOA	Paxon MOA[1]
A-10	0	645	573
AV-8	0	253	220
B-1B	0	1	0
B-2	0	54	0
B-52	0	113	0
CH-47	0	0	0
C-130	0	133	111
C-17	2	55	35
E-3	0	99	0
E-767	0	29	0
F-15C	270	958	214
F-15E	0	284	215
F-15J	0	219	180
F-16	0	3,599	2,523
F-16CJ	0	265	235
F-22	971	3,688	465
GR1	0	275	231
HC-130	0	0	0
F-18	6	112	0
HH-60	0	0	0
KC-10	0	1	15
KC-130	0	16	393
KC-135R	3	416	20
KC-767	0	24	0
OH-58	0	0	0
UH-60	0	0	0
Total	**1,251**	**11,238**	**5,430**

1. Paxon MOA sorties are estimated to be the same as the 2011 Delta MOA sorties.

Alternatives A and E Change in Number of Sorties with Portions Under 3,000 ft

Aircraft	Stony MOA	Fox 3 MOA[1]	Paxon MOA
A-10	0	645	573
AV-8	0	253	220
B-1B	0	1	0
B-2	0	54	0
B-52	0	113	0
CH-47	0	0	0
C-130	0	133	111
C-17	-2	55	35
E-3	0	99	0
E-767	0	29	0
F-15C	-270	958	214
F-15E	0	284	215
F-15J	0	219	180
F-16	0	3,599	2,523
F-16CJ	0	265	235
F-22	-971	3,688	465
GR1	0	275	231
HC-130	0	0	0
F-18	-6	112	0
HH-60	0	0	0
KC-10	0	1	15
KC-130	0	16	393
KC-135R	-3	416	20
KC-767	0	24	0
OH-58	0	0	0
UH-60	0	0	0
Total	**-1,251**	**11,238**	**5,430**

1. Portion of the Fox 3 proposed sorties will occur below 3,000 feet as shown in Table F-2.

Table F-4 shows the change in emissions at the Stony MOA due to changes in operations associated with Alternatives A and E of the Fox 3 addition and new Paxon MOA action.

Table F-4. Change in Emissions at Stony MOA under Alternatives A and E of the Fox 3 MOA Expansion and New Paxon MOA Action

Aircraft	Change in Annual Criteria Pollutant Emissions (Tons/Year)						Change in Annual Green House Gas (GHG) Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
C-17	0.00	0.00	-0.28	-0.01	0.00	0.00	-107	0.00	0.00	-108
F-15C	-0.08	-0.03	-1.03	-0.06	-0.04	-0.03	-4,988	-0.16	-0.14	-5,035
F-22	0.00	-0.67	-16.70	-1.52	-0.94	-0.85	-34,215	-1.12	-0.98	-34,534
F-18	0.00	-0.09	-0.07	-0.01	0.00	0.00	-299	-0.01	-0.01	-301
KC-135	0.00	0.00	0.00	0.00	0.00	0.00	-74	0.00	0.00	-75
Total	**-0.08**	**-0.80**	**-18.08**	**-1.61**	**-0.98**	**-0.89**	**-39,683**	**-1.30**	**-1.13**	**-40,053**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. Intergovernmental Panel on Climate Change (IPCC), *Fourth Assessment Report and Global Warming Potentials*, 2007.

Table F-5 shows the change in emissions at the Fox 3 MOA due to changes in operations associated with Alternatives A and E of the Fox 3 MOA addition and new Paxon MOA action.

Table F-5. Change in Emissions at Fox 3 MOA under Alternatives A and E of the Fox 3 MOA Expansion and New Paxon MOA Action

Aircraft	Change in Annual Criteria Pollutant Emissions (Tons/Year)						Change in Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[2]
A-10	0.15	1.56	2.28	0.69	0.10	0.09	2,168	0.07	0.06	2,189
AV-8	0.02	0.28	0.44	0.07	0.01	0.01	1,938	0.06	0.06	1,956
B-1B[1]	0.00	0.00	0.01	0.00	0.00	0.00	30	0.00	0.00	30
B-2	0.00	0.00	0.00	0.00	0.00	0.00	2,248	0.07	0.06	2,268
B-52	0.03	0.03	0.35	0.05	0.01	0.01	8,318	0.27	0.24	8,396
C-130	0.07	0.39	0.19	0.29	0.05	0.04	1,052	0.03	0.03	1,061
C-17	0.03	0.09	7.79	0.41	0.03	0.03	2,939	0.10	0.08	2,966
E-3[1]	0.00	0.00	0.00	0.00	0.00	0.00	3,644	0.12	0.10	3,678
E-767[1]	0.00	0.00	0.00	0.00	0.00	0.00	888	0.03	0.03	897
F-15C	0.29	0.11	3.65	0.22	0.13	0.11	17,723	0.58	0.51	17,888
F-15E	0.05	0.05	7.58	0.24	0.05	0.04	6,238	0.20	0.18	6,296
F-15J	0.04	0.04	5.85	0.18	0.04	0.03	4,810	0.16	0.14	4,855
F-16	2.55	0.42	24.73	1.14	1.18	1.06	29,985	0.98	0.85	30,264
F-16CJ	0.19	0.03	1.82	0.08	0.09	0.08	2,208	0.07	0.06	2,228
F-22	0.00	2.56	63.42	5.77	3.59	3.24	129,955	4.25	3.70	131,166
GR1	0.09	4.47	3.39	0.66	0.06	0.06	14,928	0.49	0.43	15,067
F-18	0.04	1.81	1.37	0.27	0.03	0.02	6,053	0.20	0.17	6,109
KC-10[1]	0.00	0.00	0.00	0.00	0.00	0.00	57	0.00	0.00	57
KC-130[1]	0.00	0.00	0.00	0.00	0.00	0.00	127	0.00	0.00	128
KC-135R[1]	0.00	0.00	0.00	0.00	0.00	0.00	10,271	0.34	0.29	10,367
KC-767[1]	0.00	0.00	0.00	0.00	0.00	0.00	735	0.02	0.02	742
Total	**3.53**	**11.85**	**122.87**	**10.08**	**5.36**	**4.83**	**246,313**	**8.06**	**7.02**	**248,607**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. All aircraft activities occur in the MOA above 3,000 feet. Only changes in GHG emissions are assessed.
2. IPCC, Fourth Assessment Report and Global Warming Potentials, 2007.

Table F-6 shows the change in emissions at the New Paxon MOA due to changes in operations associated with Alternatives A and E of the Fox 3 MOA addition and New Paxon MOA action.

Table F-6. Change in Emissions at New Paxon MOA Under Alternatives A and E of the Fox 3 MOA Expansion and New Paxon MOA Action

Aircraft	Change in Criteria Pollutant Emissions (Tons/Year)						Change in Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[2]
A-10	0.14	1.38	2.02	0.61	0.09	0.08	1,926	0.06	0.05	1,944
AV-8	0.02	0.25	0.38	0.06	0.01	0.01	1,686	0.06	0.05	1,701
C-130	0.05	0.33	0.16	0.24	0.04	0.04	878	0.03	0.03	886
C-17	0.02	0.06	4.96	0.26	0.02	0.02	1,870	0.06	0.05	1,887
F-15C	0.06	0.02	0.82	0.05	0.03	0.03	3,961	0.13	0.11	3,998
F-15E	0.04	0.04	5.74	0.18	0.04	0.03	4,722	0.15	0.13	4,766
F-15J	0.03	0.03	4.80	0.15	0.03	0.03	3,953	0.13	0.11	3,990
F-16	1.79	0.30	17.34	0.80	0.83	0.74	21,020	0.69	0.60	21,216
F-16CJ	0.17	0.03	1.61	0.07	0.08	0.07	1,958	0.06	0.06	1,976
F-22	0.00	0.32	8.00	0.73	0.45	0.41	16,385	0.54	0.47	16,538
GR1	0.07	3.75	2.84	0.56	0.05	0.05	12,539	0.41	0.36	12,656
KC-10[1]	0.00	0.00	0.00	0.00	0.00	0.00	849	0.03	0.02	857
KC-130[1]	0.00	0.00	0.00	0.00	0.00	0.00	3,108	0.10	0.09	3,137
KC-135[1]	0.00	0.00	0.00	0.00	0.00	0.00	494	0.02	0.01	498
Total	**2.38**	**6.51**	**48.67**	**3.71**	**1.67**	**1.50**	**75,349**	**2.47**	**2.15**	**76,051**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. All aircraft activities occur in the MOA above 3,000 feet. Only changes in GHG emissions are assessed.
2. IPCC, Fourth Assessment Report and Global Warming Potentials, 2007.

Table F-7 shows the total change in emissions due to Alternatives A and E of the Fox 3 MOA addition and New Paxon action.

Table F-7. Total Change in Emissions for Alternatives A and E of the Fox 3 MOA Expansion and New Paxon MOA Action

Area	Change in Criteria Pollutant Emissions (Tons/Year)						Change in Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
Stony MOA	-0.08	-0.80	-18.08	-1.61	-0.98	-0.89	-39,683	-1.30	-1.13	-40,053
Fox 3 MOA	3.53	11.85	122.87	10.08	5.36	4.83	246,313	8.06	7.02	248,607
Paxon MOA	2.38	6.51	48.67	3.71	1.67	1.50	75,349	2.47	2.15	76,051
Total	**5.83**	**17.56**	**153.47**	**12.18**	**6.04**	**5.44**	**281,979**	**9.23**	**8.04**	**284,606**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, Fourth Assessment Report and Global Warming Potentials, 2007

F.2 REALISTIC LIVE ORDNANCE DELIVERY (RLOD)

Table F-8 shows the operational data for RLOD action alternatives.

Table F-8. Change in Munitions Usage for RLOD Action Alternatives A and B

Change in Munitions Usage for Alternative A

Impact Area	GBU 32
R-2202	200

Explosive Weight for GBU-32: 165.5 lb per item

Change in Munitions Usage for Alternative B

Impact Area	GBU 32
R-2202	100
R-2211	100

Table F-9 shows the emission factors used to calculate emissions from changes in munitions use from the RLOD action alternatives.

Table F-9. Munitions Emission Factors

Munitions Type	Pounds/Ton of Explosive[1]					
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
GBU-32	7.01	554.89	0.00	--	0.71	0.04

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1, Criteria pollutant emission factors obtained from "AP-42 Section 15," U.S. Environmental Protection Agency (EPA), 2008.

Table F-10 shows the change in emissions due to the operations associated with RLOD Alternative A.

Table F-10. Change in Emissions for RLOD Alternative A

Impact Area	Annual Criteria Pollutant Emissions (Tons/Year)					
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
R-2202	0.06	4.59	0.00	--	0.01	0.00
Total	**0.06**	**4.59**	**0.00**	**0.00**	**0.01**	**0.00**

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Table F-11 shows the change in emissions due to the operations associated with RLOD Alternative B.

Table F-11. Change in Emissions for RLOD Alternative B

Impact Area	Annual Criteria Pollutant Emissions (Tons/Year)					
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
R-2202	0.03	2.30	0.00	--	0.00	0.00
R-22011	0.03	2.30	0.00	--	0.00	0.00
Total	**0.06**	**4.59**	**0.00**	**0.00**	**0.01**	**0.00**

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

F.3 UNMANNED AERIAL VEHICLE

Table F-12 shows the sortie information for the unmanned aerial vehicle (UAV) corridor action.

Table F-12. UAV Sortie and Operational Information

UAV	Number of Daily Trips	Number of Days per Year	Airspeed (Knots/Hr)[1]	Airspeed (Miles/Hour)[1]	Weight (lbs)
MQ-1 (Predator)	1.6	242	70	80.57	2,250
RQ-4 (Global Hawk)	1.6	242	310	356.81	32,250
MQ-5B (Hunter)	1.6	242	106	122.006	1,600
MQ-9 (Reaper)	1.6	242	200	230.2	10,050
RQ-8B (Fire Scout)	1.6	242	110	126.61	3,150
RQ-7B (Shadow)[3]	1.6	242	90	103.59	375
MQ-1C (Gray Eagle)	1.6	242	70	80.57	2,250
BAT-MAV WASP III[2]	1.6	242	100	115.1	14

1. Airspeed and weight data obtained from AF or Navy official websites.
2. The BAT-MAV WASP III is electric powered, thus it produces no significant emissions.
3. RQ-7B airspeed and weight information estimated from internet sources.

Table F-13 shows the corridor information for the UAV corridor action.

Table F-13. UAV Corridor Information

Corridor	Distance Per Trip (miles)
Eielson Air Force Base to R-2211	30
Eielson Air Force Base to R-2205	20
Allen Army Airfield and R-2202	10
R-2202 to R-2211	30
R-2205 to R-2202	35
Fort Wainwright and R-2211	35
Fort Wainwright and R-2205	15

Table F-14 shows the Small UAV operational information and criteria pollutant emissions factors for the UAV corridor action.

Table F-14. Small UAV Operational Information and Criteria Pollutant Emissions Factors

UAV	Fuel Flow Rate (lb/hr)[1]	Pounds/Hour[2]					
		VOCs	CO	NO_x	SO_2[3]	PM_{10}	$PM_{2.5}$
MQ-1 (Predator)	114.40	1.59	0.48	2.80	0.21	0.40	0.40
MQ-5B (Hunter)	81.35	1.59	0.48	2.80	0.15	0.40	0.40
MQ-9 (Reaper)	511.01	1.59	0.48	2.80	0.92	0.40	0.40
RQ-7B (Shadow)	19.07	1.59	0.48	2.80	0.03	0.40	0.40
MQ-1C (Gray Eagle)	114.40	1.59	0.48	2.80	0.21	0.40	0.40

Key: lb/hr = pounds per hour; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. Fuel flow rates for small UAVs estimated using the RQ-4 intermediate flow rate multiplied by the weight ratio of the UAV and the RQ-4.
2. Tetra Tech, *Environmental Assessment for Routine and Recurring Unmanned Aerial Vehicle Flight Operations at Edwards Air Force Base, California*,.2006.
3. SO_2 emission factors (lb SO_2/1,000 lb fuel) were calculated as: 20 x weight percent sulfur content of the fuel, per geographic region (specifically 0.09 the Pacific region.) The factors shown were converted into pounds per hour using the fuel flow rates.

Table F-15 shows the Large UAV operational information and criteria pollutant emissions factors for the UAV corridor action.

Table F-15. Large UAV Operational Information and Emissions Factors

UAV	Fuel Flow Rate (lb/hr)[1]	Pounds/1,000 Pound Fuel[1]					
		VOCs	CO	NO_x	SO_2[2]	PM_{10}	$PM_{2.5}$
MQ-4 (Global Hawk)	1639.80	0.01	0.45	15.06	1.80	1.58	1.58

Key: lb/hr = pounds per hour; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. Tetra Tech. *Environmental Assessment for Routine and Recurring Unmanned Aerial Vehicle Flight Operations at Edwards Air Force Base, California*. 2006.
2. SO_2 emission factors (lb SO_2/1,000 lb fuel) were calculated as follows: 20 × weight percent sulfur content of the fuel, per geographic region (specifically 0.09 the Pacific region.)

Table F-16 shows the Rotary Powered UAV operational information and criteria pollutant emissions factors for the UAV corridor action.

Table F-16. Rotary Powered UAV Operational Information and Emissions Factors

UAV	Fuel Flow Rate (lb/hr)[1]	Pounds/1,000 Pound Fuel[1]					
		VOCs	CO	NO_x	SO_2[2]	PM_{10}	$PM_{2.5}$
RQ-8B (Fire Scout)	592.39	1.07	17.24	4.46	1.80	0.51	0.46

Key: lb/hr = pounds per hour; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. Air Force Center for Engineering and the Environment (AFCEE). *Air Emissions Factor Guide to Air Force Mobile Sources.* 2009.
2. SO2 emission factors (lb SO2/1,000 lb fuel) were calculated as follows: 20 × weight percent sulfur content of the fuel, per geographic region (specifically 0.09 the Pacific region.)

Table F-17 shows the greenhouse gas emission factors for aviation fuel.

Table F-17. Green House Gas Emission Factors for Aviation Fuel

Pounds/1,000 Pound Fuel[1]		
CO_2	CH_4	N_2O
3,096.18	0.10	0.09

Key: CH_4 = methane; CO_2 = carbon dioxide; GHG = greenhouse gas; N_2O = nitrous oxide

1. GHG emission factors obtained from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate Action Registry 2009).

Table F-18 shows the annual emissions by UAV type from operations in the proposed corridor between Eielson Air Force Base and R-2211.

Table F-18. Estimated Annual Emissions from UAV Operations in the Proposed Corridor Between Eielson Air Force Base and R-2211

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.11	0.03	0.20	0.01	0.03	0.03	24.81	0.00	0.00	25.04
MQ-4 (Global Hawk)	0.00	0.01	0.40	0.05	0.04	0.04	80.29	0.00	0.00	81.03
MQ-5B (Hunter)	0.07	0.02	0.13	0.01	0.02	0.02	11.65	0.00	0.00	11.76
MQ-9 (Reaper)	0.04	0.01	0.07	0.02	0.01	0.01	38.78	0.00	0.00	39.14
RQ-8B (Fire Scout)	0.03	0.46	0.12	0.05	0.01	0.01	81.74	0.00	0.00	82.50
RQ-7B (Shadow)	0.09	0.03	0.15	0.00	0.02	0.02	3.22	0.00	0.00	3.25
MQ-1C (Gray Eagle)	0.11	0.03	0.20	0.01	0.03	0.03	24.81	0.00	0.00	25.04
Total	**0.46**	**0.60**	**1.27**	**0.16**	**0.16**	**0.16**	**265.29**	**0.01**	**0.01**	**267.74**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, Fourth Assessment Report and Global Warming Potentials, 2007.

Table F-19 shows the annual emissions by UAV type from operations in the proposed corridor between Eielson Air Force Base and R-2205.

Table F-19. Estimated Emissions from UAV Operations in the Proposed Corridor Between Eielson Air Force Base and R-2205

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.08	0.02	0.13	0.01	0.02	0.02	16.54	0.00	0.00	16.69
MQ-4 (Global Hawk)	0.00	0.01	0.26	0.03	0.03	0.03	53.53	0.00	0.00	54.02
MQ-5B (Hunter)	0.05	0.01	0.09	0.00	0.01	0.01	7.77	0.00	0.00	7.84
MQ-9 (Reaper)	0.03	0.01	0.05	0.02	0.01	0.01	25.85	0.00	0.00	26.09
RQ-8B (Fire Scout)	0.02	0.31	0.08	0.03	0.01	0.01	54.49	0.00	0.00	55.00
RQ-7B (Shadow)	0.06	0.02	0.10	0.00	0.01	0.01	2.14	0.00	0.00	2.16
MQ-1C (Gray Eagle)	0.08	0.02	0.13	0.01	0.02	0.02	16.54	0.00	0.00	16.69
Total	0.30	0.40	0.84	0.10	0.11	0.11	176.86	0.01	0.01	178.49

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, Fourth Assessment Report and Global Warming Potentials, 2007.

Table F-20 shows the annual emissions by UAV type from operations in the proposed corridor between Allan Army Airfield and R-2202.

Table F-20. Estimated Emissions from UAV Operations in the Proposed Corridor Between Allen Army Airfield and R-2202

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.04	0.01	0.07	0.00	0.01	0.01	8.27	0.00	0.00	8.35
MQ-4 (Global Hawk)	0.00	0.00	0.13	0.02	0.01	0.01	26.76	0.00	0.00	27.01
MQ-5B (Hunter)	0.02	0.01	0.04	0.00	0.01	0.01	3.88	0.00	0.00	3.92
MQ-9 (Reaper)	0.01	0.00	0.02	0.01	0.00	0.00	12.93	0.00	0.00	13.05
RQ-8B (Fire Scout)	0.01	0.15	0.04	0.02	0.00	0.00	27.25	0.00	0.00	27.50
RQ-7B (Shadow)	0.03	0.01	0.05	0.00	0.01	0.01	1.07	0.00	0.00	1.08
MQ-1C (Gray Eagle)	0.04	0.01	0.07	0.00	0.01	0.01	8.27	0.00	0.00	8.35
Total	**0.15**	**0.20**	**0.42**	**0.05**	**0.05**	**0.05**	**88.43**	**0.00**	**0.00**	**89.25**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, Fourth Assessment Report and Global Warming Potentials, 2007.

Table F-21 shows the annual emissions by UAV type from operations in the proposed corridor between R-2202 and R-2211.

Table F-21. Estimated Emissions from UAV Operations in the Proposed Corridor Between R-2202 and R-2211

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.11	0.03	0.20	0.01	0.03	0.03	24.81	0.00	0.00	25.04
MQ-4 (Global Hawk)	0.00	0.01	0.40	0.05	0.04	0.04	80.29	0.00	0.00	81.03
MQ-5B (Hunter)	0.07	0.02	0.13	0.01	0.02	0.02	11.65	0.00	0.00	11.76
MQ-9 (Reaper)	0.04	0.01	0.07	0.02	0.01	0.01	38.78	0.00	0.00	39.14
RQ-8B (Fire Scout)	0.03	0.46	0.12	0.05	0.01	0.01	81.74	0.00	0.00	82.50
RQ-7B (Shadow)	0.09	0.03	0.15	0.00	0.02	0.02	3.22	0.00	0.00	3.25
MQ-1C (Gray Eagle)	0.11	0.03	0.20	0.01	0.03	0.03	24.81	0.00	0.00	25.04
Total	**0.46**	**0.60**	**1.27**	**0.16**	**0.16**	**0.16**	**265.29**	**0.01**	**0.01**	**267.74**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, *Fourth Assessment Report and Global Warming Potentials*, 2007.

Table F-22 shows the annual emissions by UAV type from operations in the proposed corridor between R-2205 and R-2202.

Table F-22. Estimated Emissions from UAV Operations in the Proposed Corridor Between R-2205 and R-2202

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.13	0.04	0.23	0.02	0.03	0.03	28.94	0.00	0.00	29.21
MQ-4 (Global Hawk)	0.00	0.01	0.46	0.06	0.05	0.05	93.67	0.00	0.00	94.54
MQ-5B (Hunter)	0.09	0.03	0.15	0.01	0.02	0.02	13.59	0.00	0.00	13.72
MQ-9 (Reaper)	0.05	0.01	0.08	0.03	0.01	0.01	45.24	0.00	0.00	45.66
RQ-8B (Fire Scout)	0.03	0.54	0.14	0.06	0.02	0.01	95.36	0.00	0.00	96.25
RQ-7B (Shadow)	0.10	0.03	0.18	0.00	0.03	0.03	3.75	0.00	0.00	3.79
MQ-1C (Gray Eagle)	0.13	0.04	0.23	0.02	0.03	0.03	28.94	0.00	0.00	29.21
Total	**0.53**	**0.70**	**1.48**	**0.18**	**0.19**	**0.19**	**309.50**	**0.01**	**0.01**	**312.36**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, *Fourth Assessment Report and Global Warming Potentials*, 2007.

Table F-23 shows the annual emissions by UAV type from operations in the proposed corridor between Fort Wainwright and R-2211.

Table F-23. Estimated Emissions from UAV Operations in the Proposed Corridor Between Fort Wainwright and R-2211

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.13	0.04	0.23	0.02	0.03	0.03	28.94	0.00	0.00	29.21
MQ-4 (Global Hawk)	0.00	0.01	0.46	0.06	0.05	0.05	93.67	0.00	0.00	94.54
MQ-5B (Hunter)	0.09	0.03	0.15	0.01	0.02	0.02	13.59	0.00	0.00	13.72
MQ-9 (Reaper)	0.05	0.01	0.08	0.03	0.01	0.01	45.24	0.00	0.00	45.66
RQ-8B (Fire Scout)	0.03	0.54	0.14	0.06	0.02	0.01	95.36	0.00	0.00	96.25
RQ-7B (Shadow)	0.10	0.03	0.18	0.00	0.03	0.03	3.75	0.00	0.00	3.79
MQ-1C (Gray Eagle)	0.13	0.04	0.23	0.02	0.03	0.03	28.94	0.00	0.00	29.21
Total	**0.53**	**0.70**	**1.48**	**0.18**	**0.19**	**0.19**	**309.50**	**0.01**	**0.01**	**312.36**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, *Fourth Assessment Report and Global Warming Potentials*, 2007

Table F-24 shows the annual emissions by UAV type from operations in the proposed corridor between Fort Wainwright and R-2205.

Table F-24. Estimated Emissions from UAV Operations in the Proposed Corridor Between Fort Wainwright and R-2205

UAV	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
MQ-1 (Predator)	0.06	0.02	0.10	0.01	0.01	0.01	12.40	0.00	0.00	12.52
MQ-4 (Global Hawk)	0.00	0.01	0.20	0.02	0.02	0.02	40.14	0.00	0.00	40.52
MQ-5B (Hunter)	0.04	0.01	0.07	0.00	0.01	0.01	5.82	0.00	0.00	5.88
MQ-9 (Reaper)	0.02	0.01	0.03	0.01	0.00	0.00	19.39	0.00	0.00	19.57
RQ-8B (Fire Scout)	0.01	0.23	0.06	0.02	0.01	0.01	40.87	0.00	0.00	41.25
RQ-7B (Shadow)	0.04	0.01	0.08	0.00	0.01	0.01	1.61	0.00	0.00	1.62
MQ-1C (Gray Eagle)	0.06	0.02	0.10	0.01	0.01	0.01	12.40	0.00	0.00	12.52
Total	**0.23**	**0.30**	**0.63**	**0.08**	**0.08**	**0.08**	**132.64**	**0.00**	**0.00**	**133.87**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, *Fourth Assessment Report and Global Warming Potentials*, 2007.

Table F-25 shows the annual emissions from operations in all UAV corridors.

Table F-25. Total Estimated Emissions from UAV Operations in Proposed Corridors

Corridor	Criteria Pollutant Emissions (Tons/Year)						Annual GHG Emissions (Metric Tons/Year)			
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e[1]
Eielson Air Force Base to R-2211	0.46	0.60	1.27	0.16	0.16	0.16	265.29	0.01	0.01	267.74
Eielson Air Force Base to R-2205	0.30	0.40	0.84	0.10	0.11	0.11	176.86	0.01	0.01	178.49
Allen Army Airfield and R-2202	0.15	0.20	0.42	0.05	0.05	0.05	88.43	0.00	0.00	89.25
R-2202 to R-2211	0.46	0.60	1.27	0.16	0.16	0.16	265.29	0.01	0.01	267.74
R-2205 to R-2202	0.53	0.70	1.48	0.18	0.19	0.19	309.50	0.01	0.01	312.36
Fort Wainwright and R-2211	0.53	0.70	1.48	0.18	0.19	0.19	309.50	0.01	0.01	312.36
Fort Wainwright and R-2205	0.23	0.30	0.63	0.08	0.08	0.08	132.64	0.00	0.00	133.87
Total	**2.66**	**3.51**	**7.39**	**0.91**	**0.95**	**0.94**	**1,547.52**	**0.05**	**0.04**	**1,561.81**

Key: CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; N_2O = nitrous oxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. IPCC, *Fourth Assessment Report and Global Warming Potentials*, 2007.

Appendix G
Biological Resources

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AGL	above ground level
BMP	Best Management Practice
DTA	Donnelly Training Area
GIS	Geographic Information System
ITAM	Integrated Training Area Management
JPARC	Joint Pacific Alaska Range Complex
LRAM	Land Rehabilitation and Maintenance
MFE	Major Flying Exercise
MOA	Military Operations Area
MSL	mean sea level
RTLA	Range and Training Land Assessment
SOP	Standard Operating Procedure
TFTA	Tanana Flats Training Area
USARAK	U.S. Army Alaska
USFWS	U.S. Fish and Wildlife Service
YTA	Yukon Training Area

APPENDIX G
BIOLOGICAL RESOURCES

G.1 BIOLOGICAL RESOURCE EXISTING MITIGATION MEASURES, BEST MANAGEMENT PRACTICES (BMPs), AND STANDARD OPERATING PROCEDURES (SOPs)

Table G-1 lists biological resource mitigations, best management practices (BMPs), and standard operating procedures (SOPs) that have been identified in previous U.S. Army Alaska (USARAK), U.S. Air Force (Air Force), and U.S. Navy (Navy) documents and that are applicable to one or more Joint Pacific Alaska Range Complex (JPARC) actions. Certain of these were originally developed for specific areas, and the language will need to be adapted to apply to specific JPARC definitive or programmatic actions subsequent to internal review.

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
Mitigation Measures				
1.	Birds - Flight Avoidance	Reducing potential noise impacts to peregrine falcons and other resources by increasing existing flight avoidance efforts on the Yukon, Charley, and Kandik Rivers, within appropriate areas of Yukon Military Operations Areas (MOAs) 1, 2, 3, and 4 and by extending the avoidance period from April 15 to September 15.	Fairbanks Area of Interest	Air Force 1997, 2010
2.	Live Fire – Other Wildlife	Continued compliance with U.S. Army Alaska (USARAK) Regulation 350-2, which requires units that discover wildlife (large mammals) on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control office.	USAG-AK lands	USARAK 2011 , USARAK 2009a
3.	Cranes – Overflights	Pilots will be made aware of sandhill crane roosts along the Delta River and in the Donnelly Training Area (DTA) during spring and fall migration, and advised to alter travel paths during these times. This advisory will reduce the potential for disturbance of those areas.	All military lands and installations in Alaska and other lands and airspace in Alaska that could be affected	USARAK 2009b
4.	Eagles – Construction	Survey construction sites, based on USFWS criteria, to ensure construction and occupancy of facilities would not impact eagle nesting and feeding habits.	All military lands and installations in Alaska and other lands and airspace in Alaska that could be affected	USARAK 2009b
5.	Bison	Continue to limit firing within 1,500 meters of bison.	Fort Wainwright, DTA	USARAK 2008a

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents *(continued)*

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
6.	Wildlife – Overflights	Protect "at-risk" wildlife populations by restricting overflights during critical lifecycle periods. "At-risk" populations and temporal and spatial protection parameters to be established through consultation with management agencies, and the smallest practicable and effective area mitigated.	All MOAs	Air Force 1997
7.	Caribou – Overflights	Protecting the Delta caribou herd by establishing a minimum overflight altitude of 3,000 feet above ground level (AGL), over calving areas, in appropriate areas of the Birch and Eielson MOAs from May 15 to June 15.	Fairbanks Area of Interest	Air Force 1997, 2010
8.	Dall Sheep – Overflights	Protecting Dall sheep by establishing a minimum overflight altitude of 5,000 feet AGL over lambing areas and spring mineral licks, in appropriate areas of Yukon 1, 2, 3, and 4, Buffalo, Eielson, and Fox MOAs (nominally May 15 to June 15), and over rutting areas (nominally from November 15 to December 15).	Fairbanks Area of Interest	Air Force 1997, 2010
9.	Invasive Species	Continue collaborative invasive species management efforts with local area agencies and entities and include recommendations from these efforts in the development of garrisons' invasive species programs.	Fort Wainwright, DTA	USARAK 2008a
10.	Supersonic	Minimizing potential impacts associated with supersonic operations by conducting supersonic operations at or above 5,000 feet AGL or 12,000 feet above MSL, whichever is higher.	Fairbanks Area of Interest	Air Force 1997, 2010
11.	Resource Protection	Reducing potential impacts to subsistence and other resources by restricting the use of Yukon 5 to major flying exercises (MFEs) only and to sport hunting by conducting no MFEs during January, September or December.	Fairbanks Area of Interest, all MOAs	Air Force 1997, 2010
12.	Vegetation	Conduct only hand clearing of trees greater than 1 inch in diameter or 5 feet in height within 50-foot vegetation buffer areas along either side of ephemeral and intermittent streams or other specifically designated areas.	USAG-FWA lands	USARAK 2008b
13.	Vehicles and Streams	No tracked or wheeled maneuvering is permitted within a 50-meter buffer around all streams, lakes, and any open, flowing water during the summer unless crossing at a 90-degree angle to the stream. Fish spawning streams will not be crossed during summer.	USAG-FWA lands	USARAK 2005a, USARAK 2009a
14.	Native Species	Consideration will be given to native species as part of any revegetation initiative.	Fort Wainwright, DTA	USARAK 2008a
15.	Wildlife – Noise	Continue to conduct a detailed study to assess the effects of noise on wildlife. This would help natural resources and range managers to coordinate training schedules that minimize impacts to wildlife populations.	Fort Wainwright	USARAK 2004

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents *(continued)*

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
16.	Bison	USAG-FWA and USARAK have agreed not to conduct activities or operations in or near bison habitat during mid-February to early September when bison are present to minimize adverse effects on bison (USARAK 1999).	USAG-FWA lands	USARAK 2006a
17.	Wildfires – Vegetation, Habitats	When fire risk index is moderate or higher (when weather and fuels conditions are conducive to quick fire ignition and spread), use of pyrotechnics (including smoke, trip flares, or tracers) prohibited unless used in container that completely contains all burning elements of the device.	USAG-FWA lands	USARAK 2006a
18.	Aircraft, River Corridor Protection	Aircraft are required to maintain a minimum flight altitude of at least 1,500 feet AGL over the Chena River Recreation Area from May 1 through September 30.	Fort Wainwright, Fort Greely	USARAK 1999
19.	Aircraft, Habitat Protection	Avoiding the creation of aircraft noise around the Gulkana and Delta National Wild and Scenic Rivers, Tangle Lakes area, Richardson Highway, and trumpeter swan nesting areas within the Fox MOA eastern boundary.	Fairbanks Area of Interest	Air Force 2010
20.	Aircraft, Habitat Protection	Reducing aircraft noise in the Salcha River and Harding Lake areas within the northwest boundary of the Birch MOA.	Fairbanks Area of Interest	Air Force 2010
Best Management Practices (BMPs) and Standard Operating Procedures (SOPs)				
21.	Marine Wildlife	The majority of aircraft activities that might affect seabirds are concentrated within the Temporary Maritime Activities Area (TMAA) where the potential for bird aircraft strikes exists. Pursuant to Navy instruction (OPNAVINST 3750.6R – Navy 2009), measures to evaluate and reduce or eliminate this hazard to aircraft, aircrews, and birds are implemented during activities in the TMAA.	Gulf of Alaska Temporary Maritime Activities Area	Navy 2011
22.	Marine Wildlife	Monitoring of seabird populations and colonies by conservation groups and researchers is conducted intermittently within coastal areas and offshore islands with limited support from various military commands.	Gulf of Alaska Temporary Maritime Activities Area	Navy 2011
23.	Construction Re-seeding	Permanent seeding is used to control runoff and erosion on disturbed areas by establishing perennial vegetative cover from seed. It is used to reduce erosion, to decrease sediment yields from disturbed areas, and to provide permanent stabilization. Re-seed areas directly affected by construction with native grass or other appropriate vegetation. Seed and vegetation sourcing should be scrutinized to assure native compliance.	USAG-FWA lands	USARAK 2005b, USARAK 2008b
24.	Preserving Natural Vegetation	The principal advantage of preserving natural vegetation is the protection of desirable trees, vines, bushes, and grasses from damage during project development. Vegetation provides erosion control, storm water detention,	USAG-FWA lands	USARAK 2005b

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents *(continued)*

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
		biofiltration, and aesthetic values to a site during and after construction activities.		
25.	Bird Habitat	In accordance with the Fort Wainwright's adherence to the Migratory Bird Treaty Act (MBTA), clearing of vegetation would occur before May 1 or after July 15 to minimize impacts on ground and tree nesting birds. Clearing of vegetation may occur from May 1 to July 15 if surveys confirm that no active nests are present in the project area.	Fort Wainwright	USARAK 2007a
26.	Streambank Stabilization and Repair	Conduct stream bank stabilization and repair. Construct or maintain hardened sites on stream banks or shorelines where bridging training habitually occurs. Harden shoreline for habitual amphibious training. Conduct stream bank habitat improvement. Utilize land rehabilitation and maintenance standard practice such as streambank repair (interior Alaska or South Central Alaska), revegetation, and soil stabilization practices (temporary and permanent).	USAG-FWA lands	USARAK 2007b
27.	Watershed Soil Rehabilitation	Conduct soil rehabilitation in the training areas to improve training realism and support long-term sustainability. Utilize the land rehabilitation and maintenance standard practice of revegetation by employing a number of methods, including but not limited to aerial seeding, band fertilizer, broadcast fertilizer, broadcast seeding, chiseling, drill seeding, fabrics & netting, filter stripping, grassed waterways, mulching, hydro-seeding, soil amendments such as limestone & gypsum, moldboard plowing, offset disking, straw mulch, crimped straw mulch, disked sub-soiling, tandem disking, critical area treatment, grass sods, grass stolons, rhizomes, or topsoiling. Employ techniques to prevent or reduce the effects of wind erosion and control dust on and off roads. Methods include but are not limited to windrows, revegetation, aggregate application, windbreaks, surface roughness, wind strip cropping, ridging or roughening the soil surface to trap moving soil particles, and applying water or other emulsions to exposed soil.	USAG-FWA lands	USARAK 2007b
28.	Wildlife Species including Threatened and Endangered	Continued annual surveys and monitoring for wildlife species including moose, bears, bison, caribou, furbearer, small mammals, breeding birds, migratory birds, swans and other waterfowl, fish, whales (including belugas in Eagle River), and other rare, threatened, and endangered fish and wildlife species that may be present at these installations.	USAG-FWA lands	USARAK 2007b, USARAK 2006b
29.	Fish and Wildlife Management	Prepare, review, and update fish and wildlife management plans, to include the fish and wildlife management activity plan and habitat management plan. Also forestry and integrated wildland fire management plans.	USAG-FWA lands	USARAK 2007b, USARAK 2006b

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents *(continued)*

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
	Plan Preparation, Review, and Update			
30.	Forest Management	Coordinate related projects (such as forestry practices, inventory, and monitoring; firewood cutting; and fuel hazard reductions) with fish and wildlife management activity plan and habitat management plan.	USAG-FWA lands	USARAK 2007b
31.	Wildfire Monitoring	Conduct monitoring of wildland fires on military lands. Wildfire monitoring includes identification and reporting, monitoring progress as the wildland fire progresses, and wildfire incident coordination.	USAG-FWA lands	USARAK 2007b
32.	Cover and Concealment	Create, upgrade, repair, protect, or maintain cover and concealment by planting, protecting, and maintaining trees and shrubs or removing vegetation and foliage to accommodate large vehicles. Utilize land rehabilitation and maintenance (LRAM) standard practices such as vegetation cutting and clearing (mechanical and hand), prescribed burning, vegetation protection, and revegetation.	USAG-FWA lands	USARAK 2007b
33.	Fuel Hazard Reduction / Fire – Fuel Breaks	Utilize LRAM standard practices such as vegetation cutting and clearing (mechanical and hand), prescribed burning, vegetation protection, and revegetation when maintaining fuel breaks, conducting firewood sales, improving training and habitat areas, timber harvests and stand improvements, and suppressing wildfires.	USAG-FWA lands	USARAK 2007b
34.	Habitat Protection	Prepare, coordinate, and review regulations and (GIS [geographic information system] environmental limitations) overlays that protect sensitive and important wildlife habitat by indicating areas where maneuver training is and is not allowed. These would tier off the continued annual surveys and monitoring for wildlife species such as moose, swans, etc.	USAG-FWA lands	USARAK 2007b, USARAK 2008b, USARAK 2006a
35.	Invasive Species Control	Conduct invasive species control to control exotic and invasive species from spreading. Control invasive species to protect natural species and improve training realism. Utilize LRAM standard practices such as vegetation cutting and clearing (mechanical and hand), prescribed burning, and biological and chemical controls. Continued vegetation management, including invasive species monitoring and management.	USAG-FWA lands	USARAK 2007b, USARAK 2008b, USARAK 2006b
36.	Land Restoration	Application of the Integrated Training Area Management (ITAM) program to inventory and monitor, repair, maintain, and enhance training lands.	USAG-FWA lands	USARAK 2008b

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents *(continued)*

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
37.	Surface Water, Construction	All construction staging, fueling, and servicing operations would be kept at a minimum of 100 feet from surface waters.	USAG-FWA lands	USARAK 2008b
38.	Vegetation	Continued implementation of Range and Training Land Assessment (RTLA) and LRAM programs to minimize and rehabilitate vegetation damage, and to gather long-term monitoring data.	USAG-FWA lands	USARAK 2008b
39.	Vegetation	Implement invasive species prevention measures during construction activities such as washing of construction equipment prior to on-site construction activities and require gravel pits to be free of invasive species.	USAG-FWA lands	USARAK 2008b
40.	Vegetation	Retain 75-foot vegetation buffer areas along either side of ephemeral and intermittent streams or other specifically designated areas. A 100-foot buffer would be maintained along Essential Fish Habitat	USAG-FWA lands	USARAK 2010
41.	Vegetation	Revegetate areas that are not recovering naturally through the LRAM program.	USAG-FWA lands	USARAK 2008b
42.	Wetlands	No fill or construction materials would be stockpiled in wetlands or waters of the U.S. without obtaining necessary permits. All equipment operation would be confined to the project footprint to prevent unnecessary damage to adjacent wetlands and vegetation.	USAG-FWA lands	USARAK 2008b
43.	Wetlands	Stabilizing of all disturbed areas resulting from project construction using native vegetation to minimize erosion and subsequent sedimentation of wetlands and streams.	USAG-FWA lands	USARAK 2008b
44.	Wetlands, Construction	All cuts, fills, and disturbed areas resulting from project construction would be stabilized using native or other appropriate vegetation to minimize erosion and subsequent sedimentation of wetlands and streams.	USAG-FWA lands	USARAK 2008b
45.	Wildlife and Fisheries	Continued compliance with Federal and State laws and regulations relating to fish and wildlife conservation or management.	USAG-FWA lands	USARAK 2008b
46.	Wildlife and Fisheries	Continued development and implementation of an information and education program for personnel using USAG-FWA lands.	USAG-FWA lands	USARAK 2008b, USARAK 2006b
47.	Wildlife and Fisheries	Continued monitoring of effects of military training on select wildlife species (especially herd animals and waterfowl) and fisheries during vital seasons such as breeding, rearing of young, and migration.	USAG-FWA lands	USARAK 2008b
48.	Wildlife and Fisheries	To the greatest extent practicable, vegetation clearing would be avoided during the May 1 through July 15 USFWS Region 7 guidelines to reduce impacts to nesting migratory birds. Visible bird nests would be identified and avoided.	USAG-FWA lands	USARAK 2008b

Table G-1. Biological Resource Mitigation Measures, Best Management Practices (BMPs), and Standard Operating Procedures (SOPs) – Existing and Proposed from Past Documents *(continued)*

No.	Biological Subtopic	Mitigation, BMP, or SOP Description	Overlap with JPARC Location	Reference
49.	BMPs currently in place to respond to new or increasing impacts.	Continued implementation of the INRMP, which helps maintain natural resource sustainability. The INRMP contains specific actions to inventory, maintain, and improve wildlife and fisheries resources and their habitat.	USAG-FWA lands	USARAK 2008b
50.	Invasive Species Management	Conduct removal of invasive wildlife species from military lands, such as pike.	USAG-FWA lands	USARAK 2007b, USARAK 2006b
51.	Wildlife Harvest	Provide support to conduct wildlife harvest by setting population goals, supporting check stations, and enforcing state and federal laws, regulations, and policies during hunting seasons.	USAG-FWA lands	USARAK 2007b
52.	Wildlife Protection and Conflict Avoidance	Put in place measures to protect wildlife species and to promote conflict avoidance through policies and regulations.	USAG-FWA lands	USARAK 2007b
53.	Vegetation	Use of the RTLA program and LRAM program to inventory land conditions, monitor vegetation trends, repair damaged areas, and minimize future damage.	USAG-FWA lands	USARAK 2008b
54.	Special Interest Areas	Designate and manage appropriate areas as special interest areas.	USAG-FWA lands	USARAK 2007b
55.	Fish and Wildlife	Harassment of fish and wildlife is prohibited. Any action which disturbs fish and wildlife is considered harassment by Federal and Alaska state law. Harassment includes such things as pursuit with vehicles or aircraft, feeding and shooting of wildlife. Individuals who harass fish and wildlife are subject to prosecution. In addition, impact and training areas may be temporarily closed to artillery fire and aerial bombardment during periods of significant fish and wildlife use. The Alpha Impact Area at Fort Wainwright is closed 15 May through 30 June for moose calving.	USAG-FWA lands	USARAK 2009a
56.	Fish Habitat	Installation ITAM best management procedures are incorporated to minimize impact on fish habitat related to stream crossing and associated disturbance and/or erosion during maneuver training.	Fort Wainwright, DTA	USARAK 2008a

[1] Wording of measures to be adapted for specific JPARC locations, where applicable, subsequent to review.

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Appendix H
Cultural Resources

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ACRONYMS AND ABBREVIATIONS

ANCSA	Alaska Native Claims Settlement Act
BAX	Battle Area Complex
JPARC	Joint Pacific Alaska Range Complex
MOA	Military Operations Area
NRHP	National Register of Historic Places
UAV	unmanned aerial vehicle

APPENDIX H
CULTURAL RESOURCES

Table H-1. NRHP-Listed Resources Under JPARC Airspace

Airspace	Property	Location
Buffalo MOA, Delta 4 MOA, Buffalo MOA (XB)	Rapids Roadhouse	Mile 227.4, Richardson Highway
Delta 3 MOA	Sullivan Roadhouse	Mile 226, Richardson Highway
Delta 3 MOA	Big Delta Historic District	Richardson Highway, Mile 274.5 at junction of Tanana and Delta Rivers
Delta 3 MOA	Rika's Landing Roadhouse	Mile 252, Richardson Highway.
Yukon 3B MOA	Kink, The	East of Fairbanks, part of N fork of Fortymile River
Yukon 2 MOA, Yukon 2 MOA (XD)	Coal Creek Historic Mining District	Along the Yukon R., SE of Circle, in Yukon-Charley Rivers NP
Yukon 2 MOA, Yukon 2 MOA (XCB)	Slaven, Frank, Roadhouse	Left bank of the Yukon River, 0.25 mile from the mouth of Coal Creek
Yukon 2 MOA, Yukon 2 MOA (XCB)	Woodchopper Roadhouse	Left bank of the Yukon River, 1 mile up from Woodchopper Creek
Yukon 2 MOA, Yukon 2 MOA (XCB)	McGregor, George, Cabin	Left bank of the Yukon River, 2 miles down from Coal Creek
Yukon 2 MOA, Yukon 2 MOA (XCB)	Beiderman, Ed, Fish Camp	Left bank of the Yukon River, 0.25 mile down across from the Kandick River
Yukon 2 MOA, Yukon 2 MOA (XA)	Central House	Mile 128, Steese Highway

Key: JPARC=Joint Pacific Alaska Range Complex, MOA=Military Operations Area, NRHP=National Register of Historic Places.
Source: NRIS 2010.

Table H-2. Known Archaeological Sites in the Expanded BAX Footprint

Site Number	NRHP Eligibility	Site Type
XMH-00274	Not evaluated	Surface lithic scatter
XMH-00322	Not evaluated	Surface lithic scatter
XMH-00323	Not evaluated	Surface lithic scatter
XMH-00902	Not evaluated	Subsurface lithic scatter
XMH-00903	Not evaluated	Subsurface lithic scatter
XMH-01071	Not evaluated	Subsurface lithic scatter
XMH-01333	Not evaluated	Surface lithic scatter
XMH-01360	Not evaluated	Surface lithic scatter
XMH-01364	Not evaluated	Surface lithic scatter
XMH-01365	Not evaluated	Surface lithic scatter
XMH-01366	Not evaluated	Surface lithic scatter
XMH-01369	Not evaluated	Surface lithic scatter
XMH-01377	Not evaluated	Surface lithic scatter
XMH-01378	Not evaluated	Surface lithic scatter

Key: BAX = Battle Area Complex, NRHP=National Register of Historic Places.
Source: USAG-FWA 2012.

Table H-3. NRHP-Listed Resources Under Proposed UAV Airspace Corridors

Proposed Corridors	Property	Location
UAV Corridor between Eielson Air Force Base and R-2211	City Hall, Old	410 Cushman St., Fairbanks
	Clay Street Cemetery (AHRS Site No. FAI-164)	7th Ave. and Riverside Dr., Fairbanks
	Davis, Mary Lee, House	410 Cowles St., Fairbanks
	F. E. Company Housing	505, 507, 521, and 523 Illinois St., Fairbanks
	F. E. Company Machine Shop	612 Illinois St., Fairbanks
UAV Corridor between Eielson Air Force Base and R-2211/ UAV Corridor between Eielson Air Force Base and R-2205	F. E. Company Manager's House	757 Illinois St., Fairbanks
UAV Corridor between Eielson Air Force Base and R-2211	Federal Building	Cushman St. and 3rd Ave., Fairbanks
	Illinois Street Historic District	300-700 Illinois St., Fairbanks
	Immaculate Conception Church	115 N. Cushman St., Fairbanks
	Joslin, Falcon, House	413 Cowles St., Fairbanks
	Lacey Street Theatre	504 Second Ave., Fairbanks
	Main School	Jct. of 7th Ave. and Cushman St., Fairbanks
	Masonic Temple	809 1st Ave., Fairbanks
	Oddfellows House	825 1st Ave., Fairbanks
	Rose Building	520 Church St., Fairbanks
	Thomas, George C., Memorial Library	901 1st Ave., Fairbanks

Key: UAV=unmanned aerial vehicle, NRHP=National Register of Historic Places.

Table H-4. Federally Recognized Alaska Native Tribes Under JPARC Airspace

Airspace	Federally Recognized Alaska Native Tribe
Buffalo MOA, Delta 4 MOA	Village of Dot Lake
Buffalo MOA, Buffalo MOA (XA), Delta 4 MOA	Healy Lake Village
Fox 3 MOA, Fox 3 MOA expansion	Knik Tribe
Fox 3 MOA, Fox 3 MOA expansion	Native Village of Tyonek
Naknek 1 MOA	New Koliganek Village Council
Stony A MOA, Stony B MOA	Lime Village or Lime Village Traditional Council
Stony A MOA, Stony A (XA) MOA, Stony B MOA, Stony B MOA (XA)	Village of Stony River
Stony B MOA, Stony B (XB) MOA	Native Village of Crooked Creek
Stony B MOA	Native Village of Georgetown
Stony B MOA	Village of Red Devil
Stony B MOA, Stony B (XD) MOA	Village of Sleetmute
Yukon 2 MOA, Yukon 2 MOA (XA), Yukon 2 MOA (XCB), Yukon 2 MOA (XE),	Circle Native Community
Yukon 3 High MOA, Yukon 3A MOA, Yukon 3B MOA, Yukon 4 MOA, Yukon 4 MOA (XA)	Native Village of Eagle
Yukon 5 MOA	Chalkyitsik Village
Yukon 5 MOA	Native Village of Fort Yukon
Fox 5 MOA expansion	Chickaloon Native Village
Fox 6 MOA expansion, Paxon MOA	Gulkana Village
Paxon MOA	Cheesh-Na Tribe (formerly the Native Village of Chistochina)
Paxon MOA	Native Village of Gakona

Key: JPARC = Joint Pacific Alaska Range Complex, MOA = Military Operations Area.
Source: BLM 2011.

FWA-PA-1003

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON FORT WAINWRIGHT
1060 GAFFNEY ROAD #6000
FORT WAINWRIGHT, ALASKA 99703-6000

REPLY TO
ATTENTION OF:

PROGRAMMATIC AGREEMENT
BETWEEN
THE UNITED STATES DEPARTMENT OF THE ARMY,
AND
THE ALASKA STATE HISTORIC PRESERVATION OFFICER
REGARDING
MONITORING AND TREATMENT PLAN OF ARCHAEOLOGICAL SITES LOCATED WITHIN THE SURFACE DANGER ZONE (SDZ) OF THE A BATTLE AREA COMPLEX (BAX) TRAINING FACILITY AT FORT WAINWRIGHT, DONNELLY TRAINING AREA

WHEREAS, the United States Department of the Army (the "Army"), acting through the United States Army Garrison Fort Wainwright (USAG FWA), proposes to establish a Surface Danger Zone (SDZ) associated with the Battle Area Complex (BAX) and Combined Arms Collective Training Facility (CACTF) at Fort Wainwright's Donnelly Training Area (DTA) (hereafter referred to as "the Undertaking"); and

WHEREAS, the Undertaking entails establishing 23,741 acres downrange of the BAX complex as a restricted area in order to protect human health and safety from potential stray rounds resulting from live fire exercises at the BAX; and

WHEREAS, 136 archaeological sites that are eligible or may be eligible for listing in the National Register of Historic Places are located within the proposed SDZ and identified in Exhibit 1 hereto; and

WHEREAS, no construction or training activities will take place in the SDZ, no targets will be set up within the SDZ and no archaeological sites are within the direct line of fire; potential adverse effects to historic properties will likely be limited to impacts of stray rounds from live fire training activities at the BAX; and

WHEREAS, archaeological excavation of the 29 archaeological sites closest to the BAX range (Exhibit 1) in accordance with the research design and methods detailed in *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Section 8.0) was completed during the 2009 field season; and

WHEREAS, USAG FWA has consulted with the Alaska State Historic Preservation Officer (SHPO) pursuant to 36 CFR part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470 f) and SHPO has concurred with a finding of no adverse effect provided that a monitoring and data recovery program is implemented; and

WHEREAS, USAG FWA invited the Advisory Council on Historic Preservation (Council) to participate, and the Council declined; and

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WHEREAS, USAG FWA consulted the FWA Cultural Resources Working Group, and the Tanana-Yukon Historical Society; and

WHEREAS, USAG FWA has consulted with Alaska Native tribes from the Village of Dot Lake, Native Village of Eagle, Healy Lake Village, Northway Village, Native Village of Tanacross, and Native Village of Tetlin; and will continue to consult during the management process; and

WHEREAS, this Programmatic Agreement (PA) has been prepared in consultation with the Alaska SHPO and in accordance with 36 CFR 800. 14 (b)(1)(v); and

NOW, THEREFORE, USAG FWA and Alaska SHPO agree that upon USAG FWA's decision to proceed with the establishment of the BAX SDZ, USAG FWA shall ensure that the following stipulations are implemented in order to take into account the effects of the Undertaking on historic properties, and to satisfy USAG FWA's NHPA Section 106 responsibilities.

FWA-PA-1003

STIPULATIONS

USAG FWA shall ensure that the following stipulations are implemented:

I. MONITORING

A. Monitoring: Monitoring will be conducted in accordance with the research design and methods detailed in Exhibit 1 *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Section 7.0). Monitoring started in August of 2009, and will last for a period of no longer than 10 years, to be determined in consultation with the SHPO.

B. If monitoring activities identify adverse effects to any of the 136 known archaeological sites, or any other historic properties, located within the BAX SDZ, then Alaska SHPO will be contacted directly via email or telephone within seven days. A report of the sites affected, as well as nature and extent of effects will be submitted to the SHPO within 60 days. USAG FWA will then develop a plan to mitigate adverse effects to affected archaeological sites in consultation with the Alaska SHPO and interested Native groups and agencies.

C. If mortar full range training rounds are used in the BAX, USAG FWA Cultural Resources staff will help site the impact area and monitor the retrieval of rounds within the BAX SDZ[1].

II. DATA RECOVERY

A. Data Analysis: Data analysis of recovered materials from the 2009 fieldwork will be completed in accordance with the research design and methods detailed in *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Section 8.0).

III. CULTURAL RESOURCE AWARENESS TRAINING

To prevent disturbance of archaeological sites by Soldiers training at the BAX range complex, as well as other Army lands in Alaska, USGA FWA will develop an educational program designed to increase Soldier awareness of cultural resources on Army lands and the laws that protect these resources. This Soldier educational program will consist of three parts:

A. Updating the USAG FWA Archaeological Resource Protection Act (ARPA) tri-fold handout, and ensuring that they are available to Soldiers at newcomer briefings.

[1] Currently, USAG FWA has no plans to use mortar full range training rounds. Mortar training crews plan to use short range training rounds that do not have the range to leave the BAX construction footprint to impact the SDZ.

B. Development of a graphical and textual display to increase Soldiers' awareness of cultural resources on the BAX SDZ and other Army lands. This display will be presented in the form of, at a minimum, one poster to be displayed at Range Control, and one interpretive panel placard to be displayed at an informational kiosk located at the BAX range.

C. Development of a Cultural Resource Awareness Powerpoint presentation to be given to Soldiers and contractors to increase knowledge of cultural resource concerns and responsible actions, and knowledge of Alaskan Native communities. The presentation will be given to relevant personnel at newcomer briefings, and prior to training or working on the BAX range. This presentation will be given throughout the duration of this PA.

IV. SUBMITTALS

A. Report of Monitoring Findings: USAG FWA will submit to Alaska SHPO, the results of monitoring on an annual basis. This will be included as part of the USAG FWA annual Cultural Resources report.

1. The BAX SDZ monitoring section of the annual report will include: a list of sites monitored; dates of site monitoring activities; a detailed description of the current overall site condition and integrity; a comparison of the site's current condition to past condition assessments; and photographs of the site. Reports of monitoring findings will include data obtained from the field site monitoring form detailed in *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Appendix 1)

2. Provided that no adverse effects occur to the sites in question as a result of use of the BAX SDZ, the FWA DTA monitoring report will be submitted to Alaska SHPO, Bureau of Land Management BLM[2] and interested Native Groups no later than May of the year following monitoring activities. If adverse effects are noted, they will be reported to SHPO in accordance with I. B.

B. Report of Excavation Findings: USAG FWA will submit to Alaska SHPO the results of the data recovery and subsequent data analysis. The following reports will be submitted:

1. A preliminary interim report detailing the field work and initial findings will be submitted to Alaska SHPO no later than April 2010. If data recovery extends past 2009, then an interim report will be submitted to Alaska SHPO by the April following each year of fieldwork. Upon receipt of the documentation, Alaska SHPO shall provide USAG FWA with review comments no later than 45 days.

[2] Army Standard Operating Procedures requires exchange of information between the Army and BLM; BLM oversees third party permitting on Army lands.

2. A final report will be submitted to Alaska SHPO no later than June two (2) years following the end of all data recovery fieldwork. Upon receipt of the documentation, Alaska SHPO shall provide USAG FWA with review comments no later than 45 days. Final submittal, taking into consideration Alaska SHPO comments, shall be no later than 60 days after receipt of review comments.

C. Submittal of updated USAG FWA ARPA tri-fold, poster, and placard: as each mitigation project is funded and subsequently initiated USAG FWA will provide drafts of the updated ARPA tri-fold, poster, and placard to Alaska SHPO within two years of the execution of this agreement. All products will be complete within three (3) years of the execution of this Agreement.

1. SHPO shall have sixty (60) days from hard copy receipt of each draft document to review and provide input.

2. USAG FWA shall consider any timely input received in developing a second submittal of the draft mitigation projects within ninety (90) days from the close of the review period.

3. USAG FWA shall provide the second submittal to SHPO within (90) days from the close of the review period.

4. SHPO shall have thirty (30) days from receipt of the draft documentation to review and provide input on the second submittal.

D. All reports will be provided to the Bureau of Land Management cultural resource staff and appropriate staff or personnel from interested Alaska Native tribes. Copies of the reports will be made available upon request to other interested parties. Sensitive site information will not be released to the public.

V. INADVERTANT DISCOVERIES

A. If cultural remains are inadvertently discovered or there are inadvertent adverse effects as a result of training or other activities associated with this undertaking, USAG FWA shall initiate consultation pursuant to 36 C. F. R. § 800.13 to resolve unforeseen the effect.

B. If any sacred objects, funerary objects, or objects of cultural patrimony are inadvertently encountered, the area will be avoided. Training will cease in the vicinity of the find, measures will be taken to protect objects, and the Cultural Resource Manager will be notified immediately so that appropriate action can be taken in order to follow regulations set forth in 43 CFR 10 Native American Graves Protection and Repatriation Act (NAGPRA).

C. If human remains are encountered, then the following actions will be taken:

a. Training/work will be stopped immediately in the locality and USAG FWA, SHPO, and the Alaska State Troopers (AST) shall be contacted immediately (Alaska Statutes 12.65.5);
b. If the remains appear recent in the judgment of the anthropologist, USAG FWA shall defer to the opinion of the AST and Alaska State Medical Examiner (SME) for a determination of whether the remains are of a forensic nature and/or subject to criminal investigation;
c. If the ethnic/cultural identity of any human remains is in question, a qualified anthropologist experienced in human remains analysis shall examine the remains. This examination will take place within 30 days of discovery;
d. If Native American remains are encountered in the archaeological excavations, USAG FWA will follow NAGPRA regulations set forth in 43 CFR 10;
e. If the remains are not Native American and a determination is made by the AST and Alaska SME that a death investigation is not warranted, then USAG FWA, in consultation with the Alaska SME, will inform the known descendents of the deceased. If no descendents are found, then the remains shall be re-interred in a designated area.

VI. CURATION OF MATERIALS

All recovered artifacts will be curated at the University of Alaska Fairbanks Museum in accordance with an existing Memorandum of Understanding (MOU). Data processing of artifacts will follow curation guidelines set by Department of Defense and the University of Alaska Museum.

VII. PROFESSIONAL STANDARDS

All work pursuant to this PA will be developed by or under the supervision of a person or persons meeting the minimum professional qualifications of an archaeologist as included in "Secretary of the Interior's Historic Preservation Professional Qualification Standards" (Federal Register Vol. 62, No.119, pp. 33719).

VIII. DISPUTE RESOLUTION

A. Should any Signatory to this PA object to the manner in which the terms of this PA are implemented, USAG FWA shall consult with the objecting party to resolve the objection. If USAG FWA cannot resolve the objection, the following shall apply:

1. USAG FWA shall forward all documentation concerning the dispute to the SHPO. The SHPO shall provide USAG FWA with a proposed resolution to the dispute within thirty (30) days of receiving adequate documentation. If USAG FWA agrees with the SHPO's resolution, then the proposed undertaking may proceed accordingly.

2. If the SHPO does not provide its advice regarding the dispute within the thirty (30) day time period, or USAG FWA and the SHPO cannot resolve the dispute, then USAG FWA shall forward all documentation relevant to the dispute, including USAG FWA's proposed resolution, to the ACHP. The ACHP shall provide USAG

FWA with its advice on the resolution of the objection within forty-five (45) days of receiving adequate documentation;

3. If the ACHP does not provide its advice regarding the dispute within the forty-five (45) day time period, USAG FWA may make a final decision on the dispute and proceed accordingly;

4. Prior to reaching a final decision on the dispute, USAG FWA shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the SHPO, ACHP, Signatories and Concurring Parties, and provide them with a copy of this written response.

5. USAG FWA's responsibilities to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

B. Should any signatory to this PA object in writing to USAG FWA regarding any action carried out or proposed with respect to the implementation of this PA, USAG FWA shall consult with the objecting party. If after initiating such consultation USAG FWA determines that the objection cannot be resolved through consultation, it shall forward all documentation relevant to the objection to ACHP, including USAG FWA's proposed response to the objection. Within 30 calendar days after receipt of all pertinent documentation, ACHP shall provide recommendation or comment on the objection.

C. Should the Council not provide comment within 30 calendar days after receipt of the pertinent documentation, USAG FWA may assume ACHP's concurrence in its proposed response to the objections.

D. USAG FWA shall take into account any ACHP recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; USAG FWA responsibility to carry out actions under this MOA not the subject of the objection shall remain unchanged.

E. At any time during implementation of any stipulation in this PA, should an objection to any such stipulation or its manner of implementation be raised by a member of the public, USAG FWA shall take the objection into account and consult as needed with the objecting party, ACHP and Alaska SHPO to address the objection.

IX. NOTICES

All notices, submissions, consents, demands, requests, or other communications which may or are required to be given hereunder to any Signatory shall be sent by (a) hand delivery (which shall be deemed to have been received upon delivery), (b) reputable overnight courier (which shall be deemed to have been received one business day after the date sent), (c) United States mail, registered or certified, return receipt requested, postage prepaid (which shall be deemed to have been received upon receipt by the sender of the return receipt), (d) facsimile, with a copy sent by reputable overnight courier (which shall be deemed to have been received when the sender receives a confirmation of successful transmission of the facsimile) or (e) electronic mail (which shall be

deemed to have been received when the sender received a confirmation of successful transmission). Such documents shall be sent to the following addresses:

If to USAG FWA:

Garrison Commander
U.S. Army Garrison Fort Wainwright
Fort Wainwright, AK 99703

with a copy to:

Directorate of Public Works
Attn: IMPC-FWA-PWE (CR Manager)
1060 Gaffney Road, #4500
Fort Wainwright, AK 99703-4500

If to SHPO:

State Historic Preservation Officer
Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501

X. AMENDMENT

USAG FWA or Alaska SHPO may request that this PA be amended, whereupon they will consult in accordance with 36 CFR § 800 to consider such amendment. In particular, they will consider the information developed in USAG-AK's reports under Stipulations I and II to determine if USAG-AK can effectively or efficiently carry out activities to support its mission through revisions to this MOA. No amendment shall take effect until it has been executed by USAG-AK and Alaska SHPO.

XI. TERMINATION

USAG FWA or Alaska SHPO may propose to terminate this PA by providing 30-calendar days notice to the other two as well as other signatories explaining the reasons for the proposed termination. Alaska SHPO and USAG FWA will consult during this period to seek agreement on amendments or other actions that will avoid termination. In the event of termination, USAG FWA will comply with 36 CFR Part 800 with regard to individual undertakings covered by this PA and not completed at time of termination.

XII. FAILURE TO CARRY OUT AGREEMENT

In the event USAG FWA does not carry out the terms of this PA or if the Council determines under 36 CFR § 800 that the terms of this PA are not being carried out, USAG FWA will comply with 36 CFR § 800.3 through 800.7 with regard to individual undertakings covered by this PA.

FWA-PA-1003

XIII. ANTI-DEFICIENCY ACT

A. All requirements set forth in this PA requiring the expenditure of USAG FWA funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by USAG FWA under the terms of this MOA will require or be interpreted to require a commitment to expend funds not obligated for a particular purpose.

B. If USAG FWA cannot perform any obligations set forth in the PA due to the unavailability of funds, USAG FWA, Alaska SHPO, and ACHP intend the remainder of the agreement to be executed. In the event that any obligation under the PA cannot be performed due to the unavailability of funds, USAG FWA agrees to utilize its best efforts to renegotiate the provision, and may require that the parties initiate consultation to develop an amendment to this PA when appropriate.

XIV. DURATION

This PA shall become effective upon execution by USAG FWA and the Alaska SHPO and shall remain in effect until terminated in accordance with Stipulation XI or 10 years after it becomes effective. If training activities on the BAX range are ongoing during that time, then USAG FWA and Alaska SHPO will review and extend this PA as necessary.

EXECUTION AND IMPLEMENTATION of this Programmatic Agreement evidences that USAG FWA has satisfied its Section 106 and Section 110(f) responsibilities for this undertaking.

Signatories:

UNITED STATES DEPARTMENT OF THE ARMY
FORT WAINWRIGHT

By: Timothy A. Jones
TIMOTHY A. JONES
COL, AV
Commanding

Date: 29 January 2010

ALASKA STATE HISTORIC PRESERVATION OFFICER

By: Judith E. Bittner
JUDITH E. BITTNER
State Historic Preservation Officer

Date: 5 February 2010

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FWA-PA-1003

Exhibit 1

Robertson, A.R.
2009 *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area. 2009*. Edited by E.P. Gaines. Colorado State University, Center for Environmental Management of Military Lands

H.1 REFERENCES

BLM (Bureau of Land Management). 2011. ANSCA (Region or Village Corporation) Selected and Conveyed Lands. BLM Alaska State Office-Branch of Information Management Resources. 28 March.

NRIS (National Register Information Service). 2010. National Register of Historic Places. Available online at http://www.nr.nps.gov.

USAG-FWA (U.S. Army Garrison–Fort Wainwright Alaska). 2012. National Historic Preservation Act Section 106 Consultation Letter for USAG-FWA projects: Unmanned Aerial Vehicle Corridor Development, Digital Multipurpose Training Range Airspace Expansion, and Battle Area Complex Airspace and Footprint Expansion. February 7.

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Appendix I
Land Use, Public Access, and Recreation

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LIST OF TABLES

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACEC	Area of Critical Environmental Concern
AICUZ	Air Installation Compatible Use Zone
ANCSA	Alaska Native Claims Settlement Act
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AGL	above ground level
ANILCA	Alaska National Interest Lands Conservation Act
AS	Alaska Statute
BLM	Bureau of Land Management
CRBAP	Copper River Basin Area Plan
DNL	Day-Night Average Sound Level
DWSR	Delta Wild and Scenic River
EARMP	East Alaska Resource Management Plan
EIS	Environmental Impact Statement
ETAP	Eastern Tanana Area Plan
FAA	Federal Aviation Administration
FLMPA	Federal Land Policy and Management Act
FNSB	Fairbanks North Star Borough
GIS	Geographic Information System
GMU	Game Management Unit
INRMP	Integrated Natural Resource Management Plan
JLUS	Joint Land Use Study
JPARC	Joint Pacific Alaska Range Complex
LUP	Land Use Plan
MOA	Military Operations Area
MSL	mean sea level
NEPA	National Environmental Policy Act
NJT	Night Joint Training
nm	nautical miles
OHV	Off-Highway Vehicle
PAO	Public Affairs Office
RLOD	Realistic Live Ordnance Delivery
RMP	Resource Management Plan
RS	Revised Statute
SRA	State Recreation Area
SRMA	Special Recreation Management Area
SRS	State Recreation Site
SULD	Special Use Land Designation
TBAP	Tanana Basin Area Plan
UAV	Unmanned Aerial Vehicle
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
YTAP	Yukon-Tanana Area Plan

APPENDIX I
LAND USE

The descriptive information provided in the following subsections is arranged alphabetically.

I.1 LAND MANAGEMENT PLANS AND STUDIES

Table I-1 lists and describes land management plans and studies that are within the JPARC study area.

Table I-1. Alaska Land Management Plans and Studies

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
Alaska Department of Natural Resources (ADNR) - Division of Mining Land and Water				
Copper River Basin Area Plan (ADNR and ADFG 1986 a)	Copper River Basin The Copper River Basin planning area, 15.9 million acres of land, is located in the eastern portion of south-central Alaska.	1986	Portions of Copper River Basin Area Plan have been modified or updated through the Gulkana River Planning efforts to ensure the whole area is managed via a coordinated effort. The majority of this land is under Federal ownership and is managed by the National Park Service or Bureau of Land Management. The Copper River Basin Area Plan addresses the management of approximately 3.3 million acres of state lands. Native corporations within the planning area are entitled to approximately 1.8 million acres of land. Numerous small tracts of privately owned land, particularly near Glennallen, Copper Center, and Kenny Lake, exist within the area, and the University of Alaska also manages several small tracts of land near Glennallen and McCarthy. The Prince William Sound Area Plan (currently underway) and the Susitna Basin Area Plan are guides for management of state lands south and west of the Copper River Basin, respectively. The Tanana Basin Area Plan is a guide for management of state land north of the Copper River Basin. This final plan describes the intended uses of state lands. The plan contains recommendations on which tracts of land should be retained by the state, sold to private citizens, or exchanged for other tracts of land. In addition, the plan includes a process to identify how the plan will be revised and updated. Plan implementation will occur primarily through administrative actions: land designations; land sales, leases, permits; relinquishments of state selected land; additional selections of land; interagency memorandums of agreement; classification orders; and mineral closing orders. In addition, the department makes recommendations to the state legislature on legislative designations. Land use classifications and mineral closing orders will be signed for state lands in the basin. These classifications and orders are the formal record of primary and secondary uses allowed on state land and are recorded on status plats. (See Chapter 3 in the EIS for a more detailed discussion of plan implementation.)	

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
Hatcher Pass Planning Hatcher Pass Management Plan (ADNR 1986) Hatcher Pass Management Plan Amendment (ADNR 1989) Hatcher Pass Management Plan Public Review Draft (March 2010) (ADNR 2010a) Hatcher Pass Management Plan Revision (ADNR 2011a) Commissioner's Decision on Requests for Reconsideration of the November 17, 2010, Adoption of the Hatcher Pass Management Plan (ADNR 2011b)	Hatcher Pass The management plan covers both the East and West sides of Hatcher Pass (Miles 8 to 37, Hatcher Pass Road), consisting of 310,310 acres, extending from the Kashwitna River drainage in the north to the foothills of privately owned land in the south, and from the boundary with the Southeast Susitna Area Plan to the west then east to the boundary of the Matanuska Valley Moose Range. This includes the foothills and mountains of the Talkeetna Mountains, Independence Mine State Historical Park, Summit Lake State Recreation Site, Bald Mountain Ridge, Government Peak, mile 16 Ski Run, Archangel Creek, Reed Lakes, Little Susitna River, Craigie Creek, Lucky Shot, and Willow Mountain areas.	May 2011	The ADNR has revised the state land management plan for 310,000 acres of state land in the Hatcher Pass Management Planning area. The 2010 Hatcher Pass Management Plan will replace the 1986 Hatcher Pass Management Plan and 1989 amendment to that plan. The 2010 management plan consists of the Public Review Draft and the Approved Revisions to the Public Review Draft. The Approved Revisions are the revisions to the draft plan adopted by the Commissioner of the Department of Natural Resources. These, plus the Public Review Draft, constitute the final plan. The Issue Response Summary addresses all of the issues identified through the public and agency comments and provides recommendations for revisions to the plan where appropriate. Refer to the Issue Response Summary for an evaluation of the issues and ADNR responses to them. The purpose of the 2010 Hatcher Pass Management Plan is to provide a basis for decision making on the management of land and resources on state and borough lands within the plan boundary. It is used by the Division of Mining, Land and Water and the Division of Parks and Outdoor Recreation as the basis for overall area management and by the Division of Parks and Outdoor Recreation in daily operational decisions. Mat-Su Borough land in the Government Peak unit is also affected by the recommendations of the plan. The Hatcher Pass Management Plan designates primary uses on state land, provides general management guidelines for a variety of land uses and resources, and identifies specific management intent for individual units of land. All state land within the planning area is primarily designated for recreational use, consistent with the 1986 Management Plan. This land will be retained in state ownership and managed primarily for public recreation. A Land Classification Order will be adopted with this plan, which classifies each unit of land consistent with the land use designations specified in the plan. Over 300,000 acres of land are classified or reclassified. The plan also provides recommendation on facility development and siting, subsurface resources, and habitat protection and identifies allowed and prohibited uses on an areawide and management-specific basis. Further, it recommends changes to the current pattern of motorized/nonmotorized areas and provides an alternative pattern for such uses, based on public input. Continued mineral development is allowed in areas now open to mining.	Fox MOA

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
Nancy Lake Planning Nancy Lake State Recreation Area Master Plan (ADNR 1983) Nancy Lake State Recreation Area Management Plan, Planning Update #1 (ADNR 2011c) Nancy Lake State Recreation Master Plan Update (In Progress)	Nancy Lake State Recreation Area NLSRS contains approximately 36 acres of state owned lands managed for intensive recreational use. A campground, picnic area, and boat launch are located within NLSRS.	In Progress	Since the last Nancy Lake State Recreation Area (NLSRA) Management Plan was finalized in 1983, the Matanuska Valley and Anchorage bowl population has grown, and development of private land on lakes adjacent to / within the recreational area has resulted in increased use and impacts on area resources. As more remote parcels are developed in the area, there is increasing pressure to provide convenient access to private lands. Additionally, the number of docks and other structures within the water bodies of NLSRA has risen dramatically and changed the character of the adjacent public lands. In an effort to address these issues, the Division of Parks and Outdoor Recreation has initiated a planning effort to revise the 1983 NLSRA plan. The revised plan will provide management guidelines, recommendations for facility development within NLSRA and will identify opportunities to enhance recreational opportunities and access. The revised plan will address the following issues identified by staff and the public: Address resource impacts from existing trails and roads. Determination of the Division of Parks and Outdoor Recreation role in providing access for private property owners within, contiguous, and adjacent to NLSRA. This issue includes OHV and highway vehicle access on the Lynx Lake Road; OHV access on Butterfly Lake Trail; and storage of boats and personal property on park-managed land and water. Establish standards for restricted openings on existing trails to allow access when conditions do not permit opening the entire area south of the parkway to snowmobiles. Establish standards for opening the entire area south of the parkway to the use of snowmobiles. Establish permit standards for dock construction on park-managed water and determine a course of action to address the over 200 existing unpermitted docks. Establish permit standards for placement of other structures (shoreline revetments, boathouses, boat launches, boat lifts, awnings, etc.) on park-managed land and water and determine a course of action to address existing unpermitted structures. Establish park specific guidance for abandonment of vehicles and structures on park-managed land and water.	

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
Yukon Tanana Basin Area				
Upper Yukon Area Plan (ADNR 2003)	Upper Yukon Area This area is situated adjacent to the Canadian border, north of the Alaska Highway and mostly south of the Yukon River. The north and northwest portions of the planning area boundary are contiguous with the Yukon - Charley Rivers National Preserve, and the south and west portions of the planning area boundary are contiguous with the boundary of the state's Tanana Basin Area Plan. Within the planning area boundary is the Fortymile River component of the National Wild and Scenic River System.	February 2003	There are approximately 5.3 million acres in the planning area under all ownerships. The Upper Yukon Area Plan directs how the Alaska Department of Natural Resources (ADNR) will manage state-owned (2,586,018 acres) and state-selected (1,938,083 acres) uplands and all shorelands, within the planning boundary. This plan describes the intended uses of state lands. The plan directs which state lands will be retained by the state and which should be sold to private citizens, used for public recreation, or used for other purposes. USES AND RESOURCES WITHIN THE PLANNING AREA **Uses of State Land.** The plan outlines management objectives for state land. This includes describing what resources and valid existing uses should be protected and what uses are most suitable for development or protection on state land during the planning horizon. **State-Selected Land and Land Susceptible to Navigation.** Some lands have been selected but not yet been conveyed to the state. Other lands are under water bodies surrounded by Federal lands that, if determined navigable, are state owned. In both cases, the plan determines how to manage these lands if they are state owned. **Land Sales.** The planning process reviewed the state land holdings to determine which undeveloped lands are suitable for settlement uses in the future. **Roads, Trails, and Access.** The plan considers access across state lands, including existing and proposed roads, trails, easements, and rights-of-way. **Mining.** The plan addresses mineral development on state land. The plan also considered policies concerning areas of state land to be subject to leasehold location or closed to new mineral location. **Recreation.** Recreation is a popular use of state land. The plan includes management intent language pertaining to the nature of recreation, which tends to be of a dispersed, motorized and nonmotorized type within the planning area. This language is included in the explanation of the General Use designation that is used to establish ADNR management direction for large areas of state land. Recreation is considered an allowed use within the planning area, consistent with the requirements of generally allowed uses under 11 AAC 96 and the	

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			standards of AS 38.05.200 as they may apply. **Fish and Wildlife Habitat and Harvest.** The plan documents fish and wildlife habitat and harvest areas and provides management intent and guidelines for these resources and uses. WHAT THE PLAN WON'T DO The Upper Yukon Area Plan is not the only way in which land management goals are implemented. The area plan is coordinated with a variety of other programs and projects implemented by the Department of Natural Resources and other state agencies. There are some important issues that are not addressed in this plan: **Non-DNR Lands.** This plan does not apply to Federal, municipal, private, University of Alaska, Alaska Department of Transportation and Public Facilities, or Mental Health Trust lands. **Fish and Wildlife.** Allocation of fish and game stocks and regulating methods and means of harvest are the responsibility of the state Boards of Fisheries and Game. **Generally Allowed Uses.** The area plan does not regulate activities that do not require a written authorization on state land, such as hiking, camping, boating, hunting, and fishing. Many low intensity forms of use are allowed on state land without authorization, consistent with 11 AAC 96.020. The section on regulations describes these uses and whether certain types of activities are controlled by more specific stipulations. **Decisions on Specific Applications.** While this plan provides general management intent for state lands, the plan does not make decisions about specific land-use authorizations. These decisions are made through the application review process. Land use authorizations must, however, be consistent with the plan and existing laws and regulations. **Actions by Agencies Other Than ADNR.** The plan does not provide management intent for prescribing actions and policies for agencies and governments other than ADNR. **Navigability Determinations.** While this plan provides management intent for shorelands beneath navigable waters, it does not make determinations as to which waters are navigable. Determinations of navigability are made by both the state and Federal governments and can be fairly detailed and complex. A listing of these determinations is available from the Division of Mining, Land and Water. Most of the streams in the planning area do not have navigability determinations	

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			and, in at least one instance, there is some degree of uncertainty between the amount and area of navigability—specifically, on the Fortymile River system. The state and the Federal governments are considering working to resolve some of the issues of navigability on the Fortymile system and, hopefully, this will provide increased certainty over how the shorelands (state owned) are to be managed in consideration of the adjacent federal uplands, which are part of the Federal Wild and Scenic River System. **Airspace and Military Operations.** The plan does not impose restrictions on civilian or military use of airspace above the planning area. This has been an issue because part of the planning area has been designated as a Military Operations Area (MOA), and Air Force training activity has had impacts on wildlife and human activities. In 1997, the Alaska MOA EIS Record of Decision mandated establishment of the 11 AF (Air Force) Resource Protection Council, which is made up of citizens and representatives from resource management agencies. The council recommends mitigation measures for the Air Force to implement. SUMMARY OF PLAN ACTIONS **Land Use Designations.** Portions of each region and all management units are assigned a land use designation that represents the uses and resources for which the area will be managed. This has been done to establish the dominant land management objective for state land. **Management Intent.** The plan presents management intent and management guidelines that explain ADNR's overall resource management objectives for each region and management unit. The plan also provides resource and use information for land managers. **Management Guidelines.** According to the Alaska Constitution, state lands are to be managed for multiple uses. When potentially conflicting uses are designated in a management unit, the plan provides guidelines to allow various uses to occur without unacceptable consequences. Reference to the management guidelines is especially critical in this area plan because the vast land area encompassed by the plan necessitates the use of the General Use designation. This is a multiple use designation, and its management intent and guidelines must be consulted in order to get a proper sense of how a tract of land is to be managed when affected by this designation. **Classifications.** All state lands in the planning area will be classified	

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			consistent with the land use designations in this plan. Classifications made by the plan will be noted to state land status plats. The Land Classification Order adopted with this plan enacts and imposes the classifications that are identified as designations in the area plan. **Summary of Plan Implementation and Modification.** The plan is implemented through administrative actions such as leases, permits, land conveyances, classification orders, and mineral orders. The plan serves as the final finding for land classifications and mineral orders. Detailed recommendations and procedures are presented within the plan implementation. Economic and social conditions in Alaska and the planning area are sure to change, and the plan must be flexible enough to change with them. The plan will be reviewed regularly to monitor progress in implementing the plan and to identify problems that may require amendment or modification. Specific modifications may be made whenever conditions warrant them, though a request for these changes must follow certain procedures. The plan may be amended after public review, consultation with the appropriate agencies, and approval by the Commissioner of ADNR. Special exceptions and minor changes must follow certain procedures.	
Yukon Tanana Area Planning Tanana Basin Area Plan for State Lands (ADNR 1991) Yukon Tanana Area Plan (YTAP) (In Progress) Planning Update (No. 1 (ADNR 2010 b)	Yukon Tanana Area General state land within boundary includes the western portion of the existing TBAP boundary; previously un-classified state owned and selected land northwest of Fairbanks (near Rampart); and state owned and selected land within the Denali Borough. Also includes the	In Progress	The Resource Assessment and Development Section, within the Division of Mining, Land and Water, has initiated the development of the Yukon-Tanana Area Plan (YTAP). The existing area plan within the YTAP boundary, the Tanana Basin Area Plan (TBAP), was adopted in 1985 and updated in 1991. The YTAP will account for changes in land ownership; to reflect the current and anticipated physical, economic, and social factors in the area and to provide a sufficient land base for the development and conservation of the state's natural resources. The YTAP boundary encompasses over 15 million acres of state and nonstate land. There are approximately 6 million acres of general state owned or selected land and almost 1 million acres of state Legislatively Designated Areas (LDAs) within the boundary. The Tanana Valley State Forest and the Minto Flats State Game Refuge are the two LDAs within this area. The remaining portion of the TBAP, with some exceptions, will be addressed in the new Eastern Tanana Area Plan (ETAP). Together, the	

Table I-1. Alaska Land Management Plans and Studies Cont'd

Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
	Tanana Valley State Forest and the Minto Flats State Game Refuge.		YTAP and the ETAP will constitute the revision of the existing Tanana Basin Area Plan and will provide management policy for state-owned and selected land in this area of the state. Management direction provided in these plans will supersede management direction contained in the existing Tanana Basin Area Plan. Both planning efforts are expected to take between 2 and 3 years to complete and will be conducted concurrently, in order to ensure consistency in approach and management recommendations. These plans will not affect Federal, borough, Mental Health Trust, University, Native, or other private lands and will not affect oil and gas lease sales or gas only lease sales. Following the completion the scoping meetings a planning update will be provided to the public. Afterwards, development will begin on the Public Review Draft of the Yukon Tanana Area Plan. Due to the size of the planning area, it may be some time before a draft of the plan is available for review.	
Eastern Tanana Planning Tanana Basin Area Plan for State Lands (ADNR 1991) Eastern Tanana Area Plan (ETAP) (In Progress) Planning Update No. 1 (ADNR 2009)	Eastern Tanana Area Includes the eastern portion of the existing TBAP boundary with the exception of Tangle Lakes Special Use Area	In Progress	The Resource Assessment and Development Section, within the Division of Mining, Land and Water, has initiated the development of the ETAP. The existing area plan within the ETAP boundary is the TBAP developed in the early 1980s, adopted in 1985, and updated in 1991. The ETAP will revise/update the existing plan to account for changes in land ownership; reflect the current and anticipated economic, social, and environmental conditions in the area; and provide a sufficient land base for the development and conservation of the state's natural resources. The ETAP boundary contains approximately 6.5 million acres of general state owned and selected lands, plus over 1 million acres of LDA located within the eastern portion of the existing TBAP boundary, with the exception of Tangle Lakes Special Use Area. This area is excluded from the ETAP, primarily because the area is being administered by the South Central Regional Office of ADNR based out of Anchorage and the area is functionally similar to other lands adjacent to the Denali Highway corridor. This area will now be included in the Copper River Basin Area plan. The remaining portion of the TBAP will now be addressed in the new YTAP. Together, the ETAP and the YTAP will constitute the revision of the existing TBAP and will provide up-to-date management direction for the state-owned and selected lands in the area. These plans will not	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			affect Federal, borough, Mental Health Trust, University, Native, or other private lands and will not affect oil and gas lease sales or gas-only lease sales. ADNR plans to hold public meetings in April 2011 to explain the planning process, gather information, and solicit your comments and input. A public review draft will be completed thereafter. Both the ETAP and the YTAP planning efforts are expected to take between 2 and 3 years to complete and will be conducted concurrently, in order to ensure consistency in approach and management policy.	
Bureau of Land Management (BLM)				
Gulkana River Planning River Management Plan Revision for Gulkana River (BLM 2006) (Revised from the 1983 Plan) Special Use Land Designation for Gulkana River Shorelands and Waters (ADL 229819) With Amendments to the Copper River Basin and Susitna Area Plans and Associated Classification Orders (SC-86-014A01 and SC-86-030A02) (BLM no date)		August 2006	MANAGEMENT PLAN The 1983 plan identifies several management objectives that have not been met, including: Identifies management objectives and recognizes that the Wild and Scenic Rivers Act requires that a national wild and scenic river corridor be administered to protect and enhance the outstandingly remarkable values for which it was designated. Establish level and distribution of recreational river use. Establish limits on uses within the river management corridor. This plan implements the following revisions: Identifies and describes the outstandingly remarkable values and management objectives for the Gulkana River corridor. Develop a management strategy for the Gulkana Wild River corridor to address increased visitor use and impacts associated with that increased use and protect resource values on the river. Update information in the 1983 plan to reflect current conditions, increased user trends on the river, and changes in law or policy. Those changes are made in this revision. The following are this plan's management goals: Prevent degradation of the water quality. Preserve the river and its immediate environment in its natural, primitive condition. Maintain or enhance fish habitats. Maintain or enhance wildlife habitats. Maintain a diversity of recreation experiences within the river corridor. Maintain scenic quality in the corridor. The following is a summary of resolutions to major issues and	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			management concerns for this plan's management area. Additional resolutions are detailed in the plan. Powerboats A powerboat closure 1mile above the confluence of the West Fork with the main stem of the Gulkana. This will be a seasonal closure (5/15 – 8/15). This closure is recommended by BLM to be adopted by ADNR in their Special Use Land Designation for the Gulkana River. At this time, ADNR has not adopted this measure in their SULD; it will remain in place as a BLM recommendation. A ban of jet skis on all segments of the river within the Wild and Scenic River corridor. This closure is recommended by BLM to be adopted by ADNR in their Special Use Land Designation for the Gulkana River. At this time, ADNR has not adopted this measure in their SULD; it will remain in place as a BLM recommendation. A seasonal closure (5/15 – 8/15) on airboats on all segments of the river within the Wild and Scenic River corridor. This closure is recommended by BLM to be adopted by ADNR in their Special Use Land Designation for the Gulkana River. At this time, ADNR has not adopted this measure in their SULD; it will remain in place as a BLM recommendation. Powerboat use (including airboats) will be allowed for access to private land, for administrative use, or for emergency purposes. Off-Highway Vehicles The use of OHVs within the wild river corridor will be limited to the following situations: OHVs may be operated on the following trails, which will be designated and marked as such on the ground: Haggard Creek trail, Middle Fork trail, Twelvemile trail, Swede Lake trail, Dickey Lake trail, Hungry Hollow trail, South Middle Fork extension trail, Northeast Middle Fork extension trail, Northwest Middle Fork extension trail, Fish Lake trail, and West Fork trail. See Map 2. Other existing trails within the corridor, including trails that have developed off the trails listed above, will be permanently closed. OHVs will be encouraged to park out of sight of the river. On some trails, OHV parking areas will be provided out of sight of the river for those users wishing to fish or camp on the river. Trail designations do not apply to snowmachines from 10/15 to 4/15. Roads	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			New roads, highways, railroads, and similar systems of overland transportation will generally not be permitted within or across the wild river corridor. Aircraft Use Permitted Within the Wild River Corridor Aircraft operations in the river corridor for traditional float plane use on lakes, for fire and rescue operations, and on traditional tundra landing areas is allowed except for use of the water surface on any part of the Gulkana River channel within the designated corridor. No commercial helicopter-supported activities will be permitted within the corridor. Air Force and FAA planning decisions have excluded the Gulkana National Wild River corridor from the Fox Military Operations Area (MOA). BLM will continue to recommend exclusion of the corridor from this MOA in any future planning documents to minimize low-flying military flights in the corridor. Wild River Corridor Management Effects on Traditional Subsistence Activities The Gulkana National Wild River corridor, as unencumbered Federal land, is part of the Federal subsistence hunting unit. As such, BLM will continue to provide access to the area subject to reasonable regulation to protect the outstandingly remarkable values of the river. Means of access that have been demonstrated to be traditional include powerboats, snowmachines, and OHVs including four-wheelers and large tracked rigs. Trapping within the wild river corridor is permitted, subject to state and Federal regulations. Establishment of new trapping cabins within the corridor will not be permitted. Subsistence use of timber for fuel wood and house logs is allowed by permit. Management Under the National Wild River Designation Effects on Hunting and Fishing Use Hunting and fishing is permitted, subject to applicable state and Federal regulations. Maintenance and Enhancement of River Water Quality All use authorizations will include measures to control water pollution. These include but are not limited to: All Special Recreation Permits issued for commercial guiding on the river require the use of portable systems for packing out human waste. Any permitted use that includes the use of OHVs will be consistent	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			with the conditions described above under Action Item 1.2. OHVs will use authorized stream crossings. Any permitted use will include stipulations for the proper storage and handling of hazardous materials. Fuel storage will not occur closer than 100 feet from any river, lake, stream, or wetland. BLM will cooperate with the Alaska Department of Environmental Conservation and, where appropriate, the U.S. Environmental Protection Agency for the purposes of preventing, eliminating, or diminishing the pollution of river water levels consistent with the Federal Clean Water Act and state water quality standards. Manage Mineral Development to Minimize Adverse Effects on the Resource Values for which the River Was Designated ANILCA, with designation of the Gulkana as a Wild and Scenic river, withdrew lands within ½ mile of the river from mineral entry or mineral leasing. No mining claims are left within the river corridor. Therefore, no mineral development or leasing will occur within the Gulkana National Wild River corridor. Mange Recreation Facilities to Provide a Positive Recreation Experience While Protecting Outstandingly Remarkable Values on the River Those facilities necessary to maintain the natural values of the river area and provide for the health and safety of the visitors are provided and will be maintained on a scheduled basis. There are currently four maintained outhouses on the river: Middle Fork, Canyon Rapids, and two at the West Fork confluence. These outhouses will receive regular maintenance by BLM, including relocation when they are full. However, Phase II and III actions on all segments of the river call for eventual removal of these facilities. Removal is contingent on implementation of all preceding Phase I or II actions (increased education, requiring users to pack out human waste) and meeting of human waste standards identified under Item 8. Dispersed campsites on the river will be managed and maintained as follows by river segment. The following section describes management indicators, standards, and Phase I and II actions that will be taken. Permitting Other Facilities Within the River Corridor Permits or leases that require permanent facilities will not be granted. Permits or leases that require temporary facilities will be considered if it can be clearly demonstrated that the use of such facility enhances the	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			outstandingly remarkable values of the river. Permits will not be issued for cabins used for recreational purposes. No new cabins will be permitted for subsistence trapping purposes. Existing cabins may be permitted if it can be clearly demonstrated that they are necessary for support of trapping operations. Management of Public Recreational Use of the Wild River Corridor Implement the indicators, standards, management actions, and monitoring described below under this action item. If monitoring determines that standards are not being met, Phase I management actions will be implemented and monitoring will continue. Phase II management actions would include a permit system limiting launches per day out of Paxson, based on number of campsites available in the first day's float. Specific actions are described within the plan that describes, by river segment, indicators, standards, management actions, and monitoring that would occur. Identify and Protect Historic and Cultural Resource Values Within the Wild River Corridor Surface-disturbing projects within the wild river corridor will not be allowed without implementing the cultural resource protection actions as outlined in 36 CFR subpart 800. Provide cultural resource interpretation information at Paxson Lake Campground. Fire Management Within the Wild River Corridor Fire suppression activities within the corridor are carried out under interagency agreement. The main stem of the Gulkana is currently classified as a modified suppression class, which provides flexibility in the selection of suppression strategies. When risks are high, the response is analogous to a Full suppression class; when risks are low, the appropriate response is analogous to Limited. The goal of a modified suppression class is to balance acres burned with suppression costs and, when appropriate, to use wildland fire to accomplish land and resource objectives. Prescribed burn plans within the Gulkana National Wild River corridor will address visual resource concerns consistent with management under a Visual Resource Management Class I. In order to protect visual resources and water quality, a vegetation buffer will be provided along the river. This will be accomplished by not lighting directly along the river and by burning within a prescription that allows for a mosaic of	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			burned/unburned vegetation within the river corridor. Prohibit open fires within the river corridor during periods of extreme fire danger. Prohibitions will be coordinated with State Division of Forestry areawide open-burning bans. Effects of the Wild and Scenic River Management on State, Native, and Other Private Lands Adjacent to the Wild River Boundaries As described in Part III of this plan, the Gulkana is a navigable river; therefore, the BLM acknowledges the state's ownership between the ordinary high water marks. State-managed lands between the ordinary high water marks will be managed cooperatively by the state and BLM, consistent with the 1985 MOU between BLM and the State of Alaska on the management of the Gulkana National Wild River and surrounding area. BLM will continue to work with the state on implementation of specific action items described in this plan. Management actions that are designed to occur within the ordinary high water marks are BLM recommendations. If they are not adopted by the state in a Special Use Land Designation, they will remain as BLM recommendations. The Gulkana National Wild River corridor is an emphasis area for acquisition of adjacent private lands. BLM will be open to purchase of adjacent private lands by willing sellers, in order to prevent development and protect resource values. Acquisitions will be consistent with FLPMA and BLM implementing regulations. For the parcels described in section III-D of this plan that have been acquired by BLM since 1983, BLM will pursue inclusion and the appropriate boundary adjustments necessary to include these in the Gulkana National Wild River corridor. Continue to lease two parcels for personal use. These two parcels are what remain as the resolution of the Burns T&M site described in section III-D of this plan. These are life-long leases and will terminate when the current lessees die. BLM will continue to coordinate with Ahtna Corporation and Gulkana Village on implementation of this plan and on management of ANCSA 17(b) easements in the Lower River portion, outside of the Gulkana National Wild River corridor. Protecting the Scenic Quality of the Landscape Within or Adjacent to the Wild River Corridor The Gulkana National Wild River corridor will be managed under a	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			Class I Visual Resource Management class, with an objective to preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention. The following management considerations will be applied: Designated OHV routes will be maintained to minimize impacts to the viewshed from the river. OHVs will be encouraged to park out of sight of the river. Mineral exploration and development is prohibited based on withdrawals associated with the ANILCA designation of the river. Prescribed fires will be conducted under a prescription that results in a mosaic burn pattern and provides a buffer along the river's edge. Subsistence firewood and house log gathering will not be conducted in a manner that leaves stumps or slash visible from the river. Dispersed campsites will be managed to minimize visual impacts (utilize vegetation screening, manage to minimize bare ground and soil compaction). Outhouses will be placed out of sight of the river, and other recreation facilities along the river will be as visually unobtrusive as possible. Will Pipelines or Electrical Transmission Facilities Be Permitted Within the Wild River Corridor? New pipelines and electrical transmissions will not be permitted within or across the wild river corridor unless conditions of ANILCA Section 1105 and the WSRA are met. Water Rights A reservation of minimum water flows sufficient for public recreation and to support the values for which the area was designated has been filed with the Alaska Department of Natural Resource, Division of Land and Water Management. BLM will continue to track this filing. SPECIAL USE LAND DESIGNATION The Gulkana River was designated as a Wild River through the Alaska National Interest Lands Conservation Act Additions, Title VI, Sec. 603 in 1980. In 1989, the 9th Circuit Court found the Gulkana River navigable and, therefore, state owned. State-owned shorelands adjoin uplands owned by the BLM, Alaska Department of Transportation and Public Facilities (DOTPF), Gulkana Village Corporation, Ahtna Inc., and a few private landowners. Because there are only a few parcels of ADNR-managed uplands adjacent to the river, and these parcels are located on the extreme upper reaches of the river's tributaries, the	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			Special Use Land Designation (SULD) does not address uses on ADNR-managed uplands along the river. The ADNR is establishing a SULD to regulate certain activities on State of Alaska shorelands and waters of the Gulkana River and its tributaries and lakes. This SULD restricts specific uses on state lands and waters within the designated area. This action also amends the Copper River Basin and Susitna Area Plans, so the river is managed as a single unit. This designation does not restrict uses outside of the designated area. Motorized access to private lands within the SULD will not be affected by this designation. The shorelands and waters of the Gulkana River and Paxson Lake have high public recreation and fish and wildlife habitat values. The Gulkana River is the largest clear water river in the Copper River System. Paxson Lake and the Gulkana River provide outstanding public recreation values, including remote camping opportunities, scenic landscapes, fishing and boating. These waters also provide considerable salmon spawning and rearing areas. Lands surrounding the Gulkana River and Paxson Lake are important habitat for wildlife and support large numbers of nesting trumpeter swans. Lands south of Paxson Lake between the Richardson Highway and the river are important caribou habitat. Commercial and noncommercial sport fishers (motorized and nonmotorized), whitewater boaters, campers, and bank anglers use this river and lake system extensively. Powerboat use is mainly on the lower river and Sourdough segments of the river. Float use occurs in all segments of the river system and on Paxson Lake. Bank angling is primarily found near access points such as trails, 17(b) easements, and access from DOTPF rights-of-way (Richardson Hwy. Bridge). Use levels for the river peak during the king salmon season and are relatively low prior to and after the season. A more primitive experience is available to users who navigate the two major river tributaries (West Fork and Middle Fork) and the main stem of the Gulkana River, particularly outside the king salmon season. The majority of the use of the shorelands and waters is from nonguided users. Use has increased substantially on the Gulkana River. Survey data indicate that some segments of the river are beginning to show signs of resource degradation and user conflict due to increased use. There are several management actions within this plan that will address these	

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			issues. The 1986 Copper River Basin Area Plan (CRBAP) addressed all state waters and shorelands along the Gulkana River that were in the planning area. The plan designated them Public Recreation and Wildlife Habitat and closed the Gulkana River shorelands to mineral entry and oil and gas leasing. The CRBAP also designated the Gulkana River, upstream from the Copper River, and lands under all navigable waters of the Middle and West forks of the Gulkana as a State Wild and Scenic River as provided by AS 38.04.070. The plan also found the river suitable for legislative designation as a State Recreation River. The Susitna Area Plan (SAP), adopted in 1985, addressed the westernmost reaches of the Middle and West forks but did not prescribe any specific management intent for the river. The plan did, however, designate a large block of land along the eastern portion of the Denali Highway, including portions of the Gulkana River, Public Recreation and Wildlife Habitat. Management Unit 27C in the Copper River Basin Area Plan is amended (SC-86-030A02) to include the navigable upper reaches of the West Fork, south branch of the West Fork, and Middle Fork Gulkana River. Where the Susitna Area Plan includes the portions of the Gulkana River (located in the Talkeetna Mountains Subregion, Subunit 1C), SAP is amended (SC-86-014A01) so that these shorelands and waters become part of Subunit 27C in the CRBAP. All lands in the expanded Unit 27C are designated public recreation and wildlife habitat and the management intent for this unit contained in the CRBAP applies to these lands with the exceptions listed in the recommendations below. Recommendations The following recommendations impact the use of the land: All lands in the existing Unit 27C in the CRBAP are currently closed to new mineral entry and mineral leasing. The shorelands added to Management Unit 27C under the plan amendments described above may be considered for mineral closure, but this action will require adoption of a mineral order amendment before they are actually closed to new mineral entry. Due to the low mineral potential in this area, lack of access, and remoteness of the area, ADNR does not foresee a need to take this action in the near term. Unlike lands in the existing Unit 27C, additions to the unit will remain open to oil and gas leasing. AS 38.04.065(i), which precludes ADNR land use plans from	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			addressing oil and gas leasing, was enacted after the CRBAP was adopted. Implement permitting actions that would ensure there is a consistent approach to registration/permits for uses on the uplands and shorelands in the SULD and the Wild River corridor to help use-sensitive river users avoid high-use days and reduce campsite competition. The CRBAP designated the Gulkana River and tributaries as a State Wild and Scenic River. Lands added to Unit 27C in the CRBAP as part of this decision are designated as a State Wild and Scenic River. Consistent with the CRBAP findings, the river segments added to Unit 27C are also suitable for legislative designation as a State Recreation River. This SULD recommends hauling out human waste and disposing of it in an approved ADEC facility. Continue to work with BLM to identify damage to the resources as well as potential conflicts between motorized and nonmotorized users of the Gulkana River and tributaries. DNR should work with BLM, ADFG, and other stakeholders to identify trails that would be designated for ORV use within the Wild River corridor. Develop information materials about the river.	
East Alaska Resource Management Plan East Alaska Record of Decision Approved Plan (BLM 2007)	From the southern slopes of the Alaska Range to the Chugach Mountains, from the Talkeetna Mountains to the Wrangell Mountains, and includes an extensive area of coastline in Prince William Sound. The area is bisected by the Glenn, Richardson and Denali Highways. The area is also	July 2007	This ROD approves the BLM's proposal to manage the public lands within the Glennallen Field Office's jurisdiction as presented in the RMP, as Alternative D, in the June 2006 Proposed East Alaska RMP and Final EIS. This ROD provides the background on development of the plan and rationale for approving the proposed decisions contained in Alternative D and describes clarifications and/or modifications made to address protests received on the plan. The attached RMP or Approved Plan describes the decisions themselves. Of the approximately 30,908,000 acres within the planning area, decisions in the Approved Plan will apply to 7,056,000 acres, classified as BLM, Native-selected, dual-selected, mineral estate, state lands, Native lands, National Park Service lands, USDA Forest Service, and private lands. The Approved Plan does not contain decisions for the surface or mineral estates of land administered by the State of Alaska, the National Park Service, the USDA Forest Service, the Fish and Wildlife Service, or private lands and minerals.	

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	bisected by the Trans-Alaska Pipeline, which runs north to south and roughly parallels the Richardson Highway. The Copper River Basin is centrally located within the planning area, while the larger communities of Cordova and Valdez are within the planning area on Prince William Sound. Residents of the cities of Anchorage, Palmer, Wasilla, and Fairbanks utilize the area heavily for recreation as well as for sport and subsistence hunting and fishing.		It is important to note the following primary management decisions in the Approved Plan: Manage uses to protect and prevent damage to public land resources and to enhance those resources where feasible. Recommend revocation of 84% of the existing ANCSA 17(d)(1) withdrawals. Recommend retention of 84% of PLO 5150 (the pipeline/utility corridor). BLM will recommend modification of PLO 5150 to allow 82,500 acres to be conveyed to the State of Alaska. Withdraw approximately 16,000 acres within the scenic portion of the Delta River Wild and Scenic river corridor from locatable mineral entry. Make approximately 5.6 million acres of public land available to mineral leasing, through revocation of existing ANCSA withdrawals. state- and Native-selected lands would not be open to mineral leasing until conveyance or relinquishment of selection. Make approximately 6.0 million acres of public land available to locatable mineral entry, through revocation of existing ANCSA withdrawals. State- and Native-selected lands would not be open to mineral entry until conveyance or relinquishment of selection. Land disposal would be used selectively in the Slana settlement area to resolve unauthorized use on failed claims. Isolated, unmanageable tracts resulting from highway realignment along the Richardson and Glenn Highways will be available for disposal. Designate 1,692,000 acres as "limited" to OHVs, where trails will be designated. Specific trails will be designated under this RMP decision for the Gulkana and Delta Wild and Scenic River corridors and Tangle Lakes Archeological District. Other areas (such as the Bering Glacier and portions of the pipeline/utility corridor) will have specific trails designated through subsequent implementation-level planning. Designate 5,320,000 acres as "limited" to OHVs, where OHVs will be encouraged to stay on existing trails. These lands consist mostly of state-selected lands, and this policy is consistent with existing state statute 11 AAC 96.025. Interim management will emphasize education but citations will be issued if deliberate violations of these conditions result in resource damage. In order to maintain an existing nonmotorized winter recreation	

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			experience in rugged, glaciated terrain, 44,000 acres in the Delta Mountains would be closed to snowmachine use, though snowmachine access to subsistence resources would be allowed. Seasonal closure would begin on October 15 or when there is 12 inches average snowfall or 6 inches of frost. Seasonal closure would run until May 15. Designate five Special Recreation Management Areas (SRMAs): Delta River, Gulkana River, Delta Range, Tiekel, and Denali Highway. The RMP is expected to complete implementation in 2012.	
Delta Wild and Scenic River Management Plan Draft Environmental Assessment for the Delta River Special Recreation Management Area Plan and East Alaska Resource Management Plan Amendment (BLM 2010)		In Progress	The 1983 Delta Wild and Scenic River Management Plan is currently undergoing a revision and requires the preparation of an EA for the Delta River Special Recreation Management Area (SRMA) Plan and an associated Land Use Plan (LUP) Amendment to the East Alaska Resource Management Plan (EARMP). The Delta River SRMA Plan focuses on recreation management decisions within the planning area. The SRMA planning process requires BLM to use a benefits-based management (BBM) approach to recreational management within the river corridor. The LUP Amendment is necessary because changes have been proposed to some of the recreation management decisions that were made in the East Alaska Resource Management Plan. The Draft Environmental Assessment (EA) was available for public comment from March 23 – May 6, 2010. A Draft EA was published March 2010. The Alaska National Interest Lands Conservation Act (ANILCA, P.L. 96-487, Sec. 603(47) December 2, 1980) established the upper stretch of the Delta River and all of the Tangle Lakes and Tangle River as a component of the Wild and Scenic Rivers System, to be administered by the Secretary of the Interior through the BLM. Subject to valid existing rights, ANILCA classified and designated approximately 18 miles of the Delta River as a "recreational" river and approximately 20 miles as a "wild" river pursuant to the Wild and Scenic Rivers Act (WSRA. P.L. 90-542). ANILCA also designated, but did not classify, 24 miles of the Tangle Lakes and Tangle River as a component of this system. The classification of these additional 24 miles as scenic was done in the original 1983 Delta Wild and Scenic	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			River (DWSR) Management Plan. The DWSR is one of a few road-accessible rivers in the state of Alaska, and less than a 6-hour drive from Fairbanks (pop. 83,000) and Anchorage (pop. 260,000). Access to the Delta River is along the Denali Highway, approximately 21 miles west of Paxson and the Richardson Highway, or 114 miles east from Cantwell and the Parks Highway. Lands within the DWSR corridor are primarily unencumbered BLM lands, except for a few private inholdings and a portion of the river corridor that has been determined to be a navigable waterway, managed by the State of Alaska. The DWSR corridor shares the same boundary as the Delta River SRMA. Most of the DWSR corridor was determined to be nonnavigable, except for a portion of the lower river located between the confluences of Garrett Creek and Phelan Creek. This navigable section within the river corridor falls under state jurisdiction, below the ordinary high water marks. For BLM lands within the DWSR corridor, implementation decisions will: Identify ORVs and associated management objectives for the DWSR corridor. Develop management actions that will be the basis for the creation of Special Rules for the river corridor in accordance with 43 CFR 8351.2-1. Develop management decisions for OHV use, including the closure of unauthorized OHV routes not designated in the EARMP, establish weight limitations for OHV use, and develop OHV trail management and maintenance prescriptions. Designate nonmotorized trails and establish associated management and maintenance prescriptions for nonmotorized trails. Develop management decisions for airplane landings and the potential for new airstrip construction. Develop management decisions for motorized boating use. Establish decisions to manage private and commercial use as directed in WSR planning guidance, including group size, length of stay, and user capacity. Establish limitations on chainsaw use, fireworks, caching of supplies, and recreational shooting. Prescribe the level and scope of future facility developments, including potential property acquisition opportunities.	

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			Guide the development of interpretative and educational materials while focusing marketing efforts to specific recreational activities. Prescribe adaptive management actions to address issues associated with litter, human waste, fire rings, campsite impacts, and visitor use limitations. Prescribe monitoring actions to ensure that management objectives are being achieved. For BLM lands within the DWSR corridor, LUP Amendment decisions will: Apply recreation planning guidance as directed in the BLM LUP Handbook 1601-1, Appendix C. Identify Recreation Management Zones and corresponding recreation niches within each Recreation Management Zone. Develop recreation management objectives for the specific recreation opportunities to be produced and the outcomes to be attained (activities, experiences and benefits). Prescribe recreation setting character conditions required to produce recreation opportunities and facilitate the attainment of both recreation experiences and beneficial outcomes. Describe an activity planning framework that addresses recreation management, marketing, monitoring, and administrative support actions (e.g., visitor services, permits and fees, and appropriate use restrictions) necessary to achieve stated recreation management objectives and setting prescriptions.	
The Eastern Interior RMP/EIS (BLM 2012))	Eastern Interior	In Progress	The Draft Eastern Interior RMP/EIS is currently being reviewed by the BLM's Washington Office. It will be released for public comment when internal review is completed. The publication date for the Draft RMP/EIS is unknown at this time. The BLM is developing an RMP for the Eastern Interior Planning Area. This plan, the Eastern Interior RMP, will provide future direction for 6.7 million acres of public land, including the White Mountains National Recreation Area, the Steese National Conservation Area, and the Fortymile area. In addition, it will cover BLM lands not currently included in an existing land use plan: the upper Black River area and scattered parcels along the highway system. The Eastern Interior RMP will eventually replace three existing BLM land use plans: the White Mountains National Recreation Area RMP	

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			(BLM 1986a), the Steese National Conservation Area RMP (BLM 1986b), and the Fortymile Management Framework Plan (BLM 1980). The Eastern Interior Planning Area is divided into four subunits: the Fortymile Subunit, the Steese Subunit, the Upper Black River Subunit, and the White Mountains Subunit. The end result of the planning process will be four Records of Decision, one for each of the four subunits.	
Central Yukon			No management plan was found for this area, but it overlaps with the JPARC study area. A majority of this area includes state-owned lands. It is potentially covered by the new Tanana Yukon Area Plans, although this is specific to state land management.	
Boroughs, Census Areas, and Municipalities				
Denali Borough				RLOD, NJT, UAV, Ground Maneuver Access
Comprehensive Plan, Denali Borough (Denali Borough no date)	Denali Borough: 250 miles north of Anchorage, and 110 miles south of Fairbanks. It is over 12,000 square miles (8.2 million acres) of extraordinary scenic and wild country, the highest mountain on the continent (Mt. McKinley, 20,320 feet), extensive and productive natural resources, a diverse economy and approximately 1,893 residents (Denali Borough no	In Progress	The current 2009 Comprehensive Plan will be replaced by the 2011 Comprehensive Plan that is currently under review.	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
	date)			
Denali Borough Code (Code Publishing Company, Denali Borough no date)	Denali Borough, see above		The following ordinance codes excerpts are related to land use and future planning within the Denali Borough area: CHAPTER 4.25: CLASSIFICATION OF BOROUGH-OWNED LANDS 4.25.010 Classification categories Parcels may be classified or reclassified in the following categories: Agriculture and forestry; Amenity value Light commercial Commercial Heavy industrial Light industrial Public facilities Recreation development Rural residential Townsite Established material site [Ord. 11-03 § 2; Ord. 08-09 § 2; Ord. 02-08 § 2; Code 1989 § 27-1] 4.25.020 Procedural requirements A. All borough land, except the landfill and established material sites, is unclassified and must be classified prior to any action being taken that affects that land. B. The borough administrator, the planning commission, or the public may nominate land for classification and/or sale. The planning commission will decide whether to proceed with the classification and/or sale of the land after nomination and evaluation. Nominations from the public will be presented to the planning commission at a regular meeting. C. When borough land is nominated for classification and/or sale, the Denali Borough administrator will evaluate borough-owned lands, holding at least one hearing in the area closest to the lot being classified and/or sold, and recommend the best classification for each parcel to the planning commission. The planning commission will evaluate the borough administrator's recommendations and hold at least two hearings on the matter, one of which is in the area closest to the lot under consideration. The planning commission will classify the lands	

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			based on the administrator's recommendations, public input, and other considerations. The borough assembly will act as the board of appeals and may change a classification made by the planning commission. If it is deemed appropriate to sell the land, the planning commission will make this recommendation to the administrator and the assembly [Ord. 11-03 § 2; Ord. 08-09 § 2; Ord. 02-08 § 2; Code 1989 § 27-3 (formerly 4.25.030)] **4.25.030 Definitions** "Affected landowners" are those landowners adjacent to or in sight (within 1/4 mile) of the lot seeking a conditional use permit. "Agriculture and forestry" means land suitable for raising and harvesting crops, breeding and management of livestock, dairying, commercial timber harvest, or woodlot management. Parcels may be of varying size. "Amenity value" means land that kept in its natural state provides enhanced value to adjacent parcels or to the borough as a whole, or that provides protection for important wildlife habitat, recreational opportunities, subsistence opportunities, scenic vistas, historic structures and landscapes, greenbelts, or other natural, cultural, or aesthetic qualities. "Compatible" means to coexist in harmony and meets all other restrictions in this section. "Commercial" means land suitable for development for the conduct of activities predominantly connected with the sale, rental, or distribution of products or performance of services that require an ADEC class A or B wastewater system and/or water usage over 20,000 gallons per day. "Dwelling" means a building designed or used as living quarters or private residence for people. "Established material site" means land that was designated as such by the state or Federal government. This classification becomes effective immediately upon transfer to the borough with patent or management authority. "Material" is defined as gravel, sand, rock, peat, and sod extraction and may also include other soil and vegetation extraction. "Heavy industrial" means land suitable for large industrial uses, including material extraction and processing, waste handling and storage, electric generation, transportation corridors, manufacturing, or other uses that involve excessive noise, odors, danger of explosions, hydrocarbon release, or toxic wastes that make them incompatible with	

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			most other land uses. Parcels should be sizes that will reasonably accommodate heavy machinery with sufficient buffer zones for the activities associated with this type of use. This classification includes landfills. "Home business" means that accessory use of a dwelling unit that shall constitute either entirely or partly the livelihood of a person living in the dwelling. No home business shall cause any form of pollution (sound, light, smell, electronic, etc.) that is out of place in a residential area. No lot, residence, or home business shall require a water or wastewater system greater in scope than an ADEC-approved class C system. Home businesses conducted outside of allowed structures shall require a conditional use permit. "Light commercial" means land suitable for development for the conduct of activities predominantly connected with the sale, rental, manufacturing or distribution of products or services, that require an ADEC class C waste water system and/or water usage under 20,000 gallons per day. "Light industrial" means land suitable for industrial uses that generally do not have offensive characteristics and can be conducted inside closed buildings. Such uses may include warehousing, storage, and light manufacturing not inside buildings. "Public facilities" means land reserved for public facilities including schools, clinics, day-care centers, government buildings, parks, and other public uses. Parcels are sized to meet the need for and allow for future expansion. The borough or other public entity will generally retain land in this classification. "Recreation development" means land suitable for the development of commercial recreational facilities requiring large amounts of land such as ski areas, golf courses, wilderness camps, and horse stables. "Rural residential." The purpose of this classification is to maintain the rural residential character of land already rural residential in nature or lands deemed best suited for rural residential use and minimize the potential for conflicts of use. 1. **Permitted principal uses**. Single- and multifamily residential dwelling units are permitted in this classification. 2. **Permitted secondary uses.** Parks, playgrounds, schools, community centers, libraries, churches, bed-and-breakfasts, and home businesses.	

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			3. **Development standards.** Development standards apply to lots, principal dwellings, and accessory structures. a. The minimum lot size shall be 80,000 square feet. b. Accessory structures commonly associated with residential dwellings are allowed, i.e., garages, storage sheds, greenhouses, workshops, well/pump houses, and guest cabins, etc. c. Building height is limited to two and one-half stories or 35 feet above the ground, whichever is less. d. Setbacks shall be a minimum of 10 feet around all sides of the lot. Lot lines bordering public roads shall have a 20-foot setback. No permanent dwellings or structures may be placed in these setbacks. 4. **Deed restrictions.** The assembly may require that when a lot classified as Rural Residential is sold, the uses, standards, and restrictions of this classification carry with the lot as a deed restriction and be binding on buyers, their heirs, successors and assigns. 5. **Conditional use permit.** With 100 % of affected landowners signing a petition to allow a nonconforming use or a home business conducted outside a structure to exist on a lot within an area classified as Rural Residential, a conditional permit will be issued. Home businesses that are compatible within residential areas but need to be conducted outside a structure will be granted a conditional use permit without a petition. 6. Pre-existing nonconforming uses and pre-existing nonconforming structures and dwellings are allowed, except that they may not increase in nonconformity. 7. Variances may be granted for a lot that is smaller than allowed in this classification, to maintain the residential nature of an area in which the lot is located. "Townsite" means land suitable for development of new communities or expansion of existing communities, including lots sized for a mixture of relatively dense residential and commercial development. Residential lots in this classification are 3 acres or less. Lots may be less than 1 acre in size if development plans include water and sewer facilities. "Unclassified" means land reserved for future consideration. Land must be classified before use. "Unrestricted." The Denali Borough has no restrictions on land classified unrestricted. However, Federal and/or state restrictions may	

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			apply. [Ord. 11-03 § 2; Ord. 08-09 § 2; Ord. 02-08 § 2; Code 1989 § 27-2. Formerly 4.25.020.] CHAPTER 9.25: GAS EXPLORATION AND DEVELOPMENT 9.25.010 General provisions A. Setbacks. 1. The operator will construct drill pads at least 500 feet and compressor stations at least 1,500 feet from any recorded private property line. 2. A variance may be granted from the setback requirement if the operator obtains written consent of the landowner/landowners with the adjoining property line and has obtained approval from the Denali Borough assembly following at least one public hearing. [Ord. 08-07 § 2; Ord. 05-21 § 2.]	
Fairbanks North Star Borough				**RLOD, UAV, Ground Maneuver Access**
Fairbanks North Star Borough (FNSB) Joint Land Use Study (JLUS) (ASCG 2006)	Fairbanks North Star Borough; addresses the airfields and lands in the immediate vicinity at Fort Wainwright and Eielson Air Force Base, which are both included in this study as well as the Tanana Flats Training Area and the Yukon Training Area	2006	The purpose of the Fairbanks JLUS is to provide recommendations regarding land development policies and to present a compatible implementation strategy that supports the military's mission in the Fairbanks area. 4.1 Local Jurisdiction Recommendations The JLUS identifies the following communication, coordination/organization, real estate disclosure, planning/public policy, and sound attenuation tools for all of the jurisdictions within the FNSB. 1. **Establish review procedures.** To help ensure that the military is informed about any land use designation or action that might impact lands within the 65 day-night average sound level (DNL) contour, the FNSB planning department would contact appropriate personnel to discuss and invite participation in actions pertaining to projects that may occur within the military's 65-DNL contour. The FNSB planning department would take the lead and work with the military leaders to identify the appropriate military contacts and establish review procedures. 2. **Create a JLUS Natural Resources Working Group.**	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			To continue the momentum created by this effort, the local jurisdictions, in collaboration with the Army and the Air Force, would establish an FNSB Joint Land Use Natural Resources Working Group to address issues of recreational access and resource management. The group would focus on issues around training ranges, including civilian recreational access and natural resource management. The group would include a full range of stakeholder organizations that have an interest in hunting, fishing, recreation access, and habitat management on military training ranges. This committee could also be expanded to include the Delta Junction community and military representatives in that area. FNSB Planning Department is suggested as the organization to provide staff support, meeting space, and other logistical support in a similar manner as for other FNSB-sponsored committees. 3. **Continue meeting with community leaders for informal information sharing.** Maintain regularly scheduled meetings in FNSB Mayor's office to informally and candidly share mutually beneficial community and military information. This would help to ensure ongoing sharing of information about changes on military operations, community impacts, and community needs. These meetings could also be used as a forum for periodic review of the implementation of the overall JLUS recommendations. 4. **Strengthen construction codes.** Only the City of North Pole and the City of Fairbanks have building codes. These codes would be reviewed and modified as needed to ensure proper standards are in place related to noise attenuation. This action would make sure that new language within codes related to Air Installation Compatible Use Zone (AICUZ) areas would be added to direct that construction within the AICUZ area has the recommended noise level reductions. It is assumed that the current weatherization measures in the code will meet many noise-attenuation needs. 5. **Amend Title 17 to require note on plat for subdivisions within 65 DNL contours.** Amend FNSB Title 17 to require platting board review of each preliminary subdivision layout to determine if a documented noise impact exists. If so, apply note to plat notifying potential owners of the proximity to 65-DNL contours and offer sound attenuation recommendations. This will ensure that new construction within the	

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			AICUZ area has the recommended noise level reductions on the plat and that owners will be given notice of potential noise impacts. 6. **Publicize established legal requirements for full disclosure in real estate transactions.** Alaska Statute (AS 34.70) requires full disclosure by the seller. This existing tool can and should be used to ensure all buyers of property around military bases understand the potential noise environment. This tool requires working with the local real estate community to ensure they understand and comply with this requirement. 7. **Incorporate military noise contours into FNSB Regional Comprehensive Plan and Development Codes.** Amend the FNSB Regional Comprehensive Plan and Zoning Code as necessary to ensure that local land use decisions are compatible with existing civilian and military aviation patterns. Expand the use of the current overlay zone to include areas within the 65-DNL contour identified by the military. 8. **Increase military awareness of civilian land use issues around installations.** Invite military representatives to the FNSB planning and platting boards on an as-needed basis to serve as two-way communicators on land use issues. This will help to educate planning commission members on impacts of their land use decisions on the military installations so they can make more fully informed decisions. 9. **Adopt encroachment prevention measures.** This would modify existing ordinances and regulations, such as Titles 17 and 18, to prevent encroachment on military lands that could compromise missions; work with military planners to obtain assistance in monitoring for enforcement purposes. This tool will help prevent development near military lands that could compromise missions, support development of compatible land uses outside the installation fence lines, and bring existing uses into compliance. In this context, "encroachment" is used to signify those uses of land closely surrounding Fort Wainwright or Eielson AFB that would impinge on the military's ability to safely carry out their mission. 10. **Adopt zoning ordinances to limit the height of objects around military airports.** While the Federal Aviation Administration does not have the authority	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			to restrict heights and obstructions, they do make recommendations and have a model (sample) ordinance (FAA Advisory Circular 150/5190-4) that communities can use to promote safety. The FNSB would adopt a similar ordinance that prevents the obstruction of imaginary surfaces around military airports, as defined in 14 Code of Federal Regulations, Part 77, Objects Affecting Navigable Airspace. This would help to prevent obstructions to airspace on land outside the military installation that could compromise aviation missions. Amend local and/or regional comprehensive plans and zoning codes as necessary. The FNSB would coordinate with military installation staff to ensure the proper criteria are used for defining the imaginary surfaces. 11. **Enforce compatible use zoning.** Establish a land use policy against rezoning land to any category that permits permanent residential development, when such land lies within the existing or future 65-DNL contour. This will prevent development of incompatible residential uses within air operations areas. 12. **Enforce mobile home and noise sensitive compatibility.** This tool would restrict mobile home development within the existing and future 65-DNL contour. This action would prevent development of incompatible residential uses within air operations area. It would require review and amendments to the Regional Comprehensive Plan and zoning codes as necessary. 13. **Maintain residential densities within existing and future noise sensitive areas.** Adopt policy forbidding an increase of residential density for existing residential areas within the existing and future 65-DNL contour. This will prevent increased development of incompatible residential uses within air operations areas. This tool requires amending the comprehensive plan and zoning codes as necessary. 4.3 Military Recommendations 1. **Monitor and provide input on land use.** The military would monitor proposed land use development that might impact current or future military impact operations. Military staff would make a commitment to attend FNSB Planning Commission meetings as necessary to provide military perspective on civilian land use decisions. This tool would serve to give important input to local planning authorities on existing or proposed noise-sensitive land use issues (such as residential development).	

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			2. **Coordinate training schedules.** The military would work with local and state government natural resources managers to communicate training schedules. This would help to minimize the impacts of training activities on wildlife populations and wildlife management particularly during hunting season. This information would be presented before the proposed JLUS Natural Resources Working Group. 3. **Continue noise complaint management process and nighttime firing notification.** Currently, each base has a noise complaint management process handled through its public affairs office (PAO). This process would continue to operate and would allow for feedback from civilians on noise issues to assist with minimizing conflicts. The PAOs also have a process to notify the public of nighttime firing exercises, which would continue, and would serve to minimize conflicts through positive communications. 4. **Strengthen public outreach efforts and communication of significant operational changes.** The military would provide 3 days notice to the public for noise generated by unusual flight patterns or training operations, atypical use of munitions, convoys, and atypical or new use of areas. This public outreach effort would expand to consider incorporating multimedia options (such as radio, television, and newspaper) and post-event notifications. In order to minimize conflicts through positive communications, the military would maintain an active presence in the Chamber of Commerce and attend and support the informational needs of the Chamber's Military Affairs Committee. The PAOs would be tasked with disseminating appropriate information. This would include contributing articles related to operations and land use to such new outlets as the *Fairbanks Daily News-Miner*, North Pole mayor's newsletter, Salcha Community Council, and ADFG newsletter. 5. **Develop an information and education program for natural resource management and continue and improve hunter awareness education.** The military would develop and implement an information and education program for personnel using military lands. The program would emphasize conservation of wildlife and natural resources and develop protocol to reduce wildlife disturbance and negative	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			wildlife-human interactions. It would provide recreational information such as hunting closures and recreational restrictions in a timely manner. The natural resources managers would develop the program and work with JLUS Natural Resources Working Group and PAOs. The military would continue to hold and expand hunter safety education courses and partner with ADFG and other hunter safety groups to provide educational opportunities to the military community. This will help to promote awareness of the Alaska outdoors environment to interested military personnel who are new to Alaska. Classes would be programmed around seasons: fall and spring hunting season, spring/summer fishing seasons. This would minimize conflicts and maximize safety and enjoyment through positive education. 6. **Build information kiosks.** To provide information opportunities outside secure perimeters for ease of access, the military would build kiosks at all primary entrances to recreational areas on military lands and provide visitors maps and information geared towards that area. This would improve communications with civilian users of military lands. 7. **Post local military noise contour maps and related information on the web and publish in local papers.** The military would make the AICUZ and the Installation Environmental Noise Management Plan and related maps available on publicly accessible website(s). At the beginning of spring, the military would publish a lay-public-friendly summary of noise related information in the local newspapers. It would include information about current and proposed changes to operations that might impact noise generation. Both of these actions would help to minimize conflicts through positive communications. 8. **Consider identification and acquisition of land that may be needed to protect military operations from encroachment.** The military would conduct an internal review to determine if there is a need to purchase or otherwise obtain ownership to lands that may be needed in the future to prevent encroachment that represents a threat to mission-essential military operations. This would remove key land use conflicts. A potential candidate might be Secluded Acres. 9. **Pursue funding for DoD conservation land purchases.** Consider partnering with local, state, and nonprofit entities to acquire land around military installations to prevent encroachment and	

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Reference/Plan	Location/District	Completed	Excerpt / Description	Related PA/Alt
			allow for compatible recreational activities, including hunting and fishing. This would minimize conflicts by purchasing land when a potential exists for recreational conflicts. 10. **Augment noise management program.** Establish (or activate) temporary noise monitoring stations when a complaint remains unresolved. Evaluate potential effects of any type of unusual noise on drivers along nearby or transecting roadways. Consider installing signs along the Richardson Highway to alert drivers to potential noise impacts. Integrate with existing PAO noise complaint process. 11. **Maintain up-to-date noise contours in GIS.** Installations would maintain up-to-date noise contours for both air traffic and firing ranges on installations in a GIS database. This information would be provided to the FNSB for integration into the Borough's data base and would be available to the public. This would assist in the review of air operations and major flight paths for conflicts with existing residences. It would also serve as a resource for individuals considering purchase of land in the impacted area. 12. **Avoid flying over residential areas to the extent practicable.** To minimize noise-related conflicts, the military would review flight operations on an ongoing basis and include civilian land use patterns into that review. To the most practical extent possible, the military would avoid flying low over residential areas. They would maintain a database of noise-related complaints, and incorporate that information into operations review. 13. **Study the potential to locate or relocate firing areas.** This would locate future firing and artillery ranges and training exercises away from noise sensitive receptors and noise-sensitive areas. Military planners would review civilian land uses in siting facilities, and meet with the Planning Commission to solicit their input. 14. **Continue ongoing convoy permitting.** Continue to use the convoy permitting process with Alaska Department of Transportation and Public Facilities. As part of the permit process, consider alternate travel routes and methods for military convoys, including line haul, split convoys (per Army Regulation 55-2), airlift, and rail to avoid traffic risks and impacts on civilian emergency response. This would help to minimize conflicts between civilian traffic	

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			and military convoys on highways. This is currently a serious issue on the Richardson Highway between Fairbanks and Delta Junction. 15. **Consider establishment of formal Memorandum of Understanding with state and Federal resource management agencies.** Use the Sikes Act amendments as a model to formalize cooperative land management responsibilities with USFWS and ADFG. This will allow for resource sharing and improved communications between Federal and State agencies. Task the natural resources managers to develop the Memorandum of Understanding and work with JLUS Natural Resources Working Group. 16. **Access cards permit system for snowmachiners.** Currently the military has a successful program for allowing snowmachiners access to military lands via an access card permit system. This would maintain this system and continue community goodwill through use of a proven ongoing program. 17. **Study longer-term lease agreements.** Consider longer-term lease agreements with local governments or recreational user groups for outlying military lands. This will provide a climate of certainty for ongoing public support and investment in those lands, e.g., Birch Hill ski area and the skeet area. Have legal staff review and determine issues. Work with congressional delegation to modify statutory requirements, if necessary. 18. **Strengthen implementation of Integrated Natural Resource Management Plans (INRMPs) as a means of enforcing JLUS recommendations.** INRMPs contain specific actions to inventory, maintain, and improve wildlife habitat, as well as proper management of natural resources and recreation resources on military installations. They also guide civilian use of military training ranges and other lands, thus minimizing conflicts between civilian and military use. By strengthening the implementation of the INRMP, there is potential for improving or maintaining good habitat and wildlife conditions. Some of the types of recommendations of the INRMP process include: Monitor the effects of military training on select wildlife species (especially herd animals and waterfowl) during critical seasons such as breeding, rearing of young, and migration. Conduct a detailed study to assess impacts of recreational vehicles to	

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			vegetation. Continue to enforce recreational vehicle use policies. Continue the use of environmental limitations overlays that indicate areas where maneuver training is and is not allowed. Provide appropriate training to MPs and land managers. The INRMP process involves regular reviews and updates. During this process, coordination with JLUS Natural Resources Working Group would be required. 19. **Maintain/initiate 2-year renewal duration.** Maintain the extended 2-year renewal duration on the Fort Wainwright and Donnelly Training Area Recreational Access Permits. A 2-year permit duration would simplify public access to military lands. It would also help to guide civilian use of military training ranges and other lands, thus minimizing conflicts between civilian and military use. 20. **Maintain USARTRAK automated phone check-in system.** Use system to monitor recreational usage of training areas through USARTRAK phone system. Continue to implement the USARTRAK automated phone check-in system, using it to monitor recreational usage of each training area. Continue to inform military and ADFG about use patterns, which should help to improve management for public access and recreation. 21. **Fund conservation officers.** Fully fund conservation officers to enforce state and Federal game laws and military rules and restrictions. This would help to guide civilian use of military training ranges and other lands, thus minimizing conflicts between civilian and military use. 22. **Partner with ADFG to create a one-stop permitting shop.** Partner with ADFG to establish a one-stop hunting and fishing permitting station at the ADFG offices in Fairbanks. This eliminates potential problems related to access to the permit office on the bases.	
Fairbanks North Star Borough Regional Comprehensive Plan (FNSB 2005)	Fairbanks North Star Borough	2005	VISION Since 1984, when the FNSB Assembly approved the first Regional Comprehensive Plan, the borough has experienced an 18.4% increase in population. This moderate level of growth brings change and opportunity to any community. In the FNSB, the opportunities brought about by growth encourage careful responses, given the unique qualities	

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			of the community and the region. The FNSB Regional Comprehensive Plan is the guide for the community's response to future growth and change. Significant opportunities that deserve attention include but are not limited to: Strengthening the borough's role as the commercial, transportation, and cultural hub of Interior Alaska. Expanding the urban area and increasing water and sewer infrastructure. Creating opportunities for development while minimizing land use conflicts. Maintaining a healthy economy that provides ongoing opportunities for residents to be gainfully employed. Integrating existing services and industries with emerging technologies. Providing essential human services that support the needs of the population. Integrating development with responsible stewardship of our resources. Encourage solving the extreme shortage of privately owned land within the borough. LAND USE **Goals and Strategies:** GOAL 1 To recognize that the foremost aspect of land use involving private property is the retention and maintenance of private property rights Strategy 1: Work for decisions by commissioners and the assembly that protect individual private property rights to the maximum extent possible. Strategy 2: Work for community end goals with a minimum impact on and disruption of individual private property rights. Strategy 3: Work to reduce, to the fullest extent possible, the natural conflict that develops between private property rights and community needs and interests. GOAL 2 To continue public land use and sales programs Strategy 4: Plan for, designate, and retain sufficient lands for future public purpose prior to the sales of public lands. Strategy 5: Plan, promote, and work diligently with other public land owners to secure ongoing release of appropriate public lands into private ownership, to expand the overall total acreage of private property.	

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			GOAL 3 To have a variety of land uses that fit the diverse needs of the community Strategy 6: Provide for commercial land uses in both urban and nonurban areas. Strategy 7: Provide a variety of residential land use opportunities. Strategy 8: Provide for industrial land uses in both urban and nonurban areas. Strategy 9: Recognize individual communities within the borough as unique planning areas. GOAL 4 To enhance development opportunities while minimizing land use conflicts Strategy 10: Attract and support development that is compatible with and enhances existing land use. Strategy 11: Encourage effective and harmonious resolution of community land use conflicts.	
Matanuska-Susitna Borough				Fox/Paxon MOA, RLOD, NJT,
Matanuska-Susitna Borough Comprehensive Development Plan (Matanuska-Susitna Borough 2005)	Matanuska-Susitna Borough	2005	This plan addresses Borough-wide issues, community-specific issues, and general goals and policy recommendations to help guide future development in order to enhance the quality of life, and the public health, safety, and welfare. The primary methods to implement the Plan are land-use regulations, a capital improvement program, and subdivision regulations. In addition to this Plan, there are several smaller plans for specific communities and areas within the Matanuska-Susitna Borough. ***Land use.*** The land use planning objective is "to maintain a healthy and diversified economy it is necessary to provide places for all development, especially commercial and industrial development; hence, land use regulations should accommodate such uses and provide investors with a clear understanding, supported by consistent policies, of where and how they may develop their specific investments. The following land use goals are presented in this comprehensive plan: Protect and enhance the public safety, health, and welfare of Borough residents. Protect residential neighborhoods and associated property values.	

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			Encourage commercial and industrial development that is compatible with residential development and local community desires. Protect and enhance the Borough's natural resources including watersheds, groundwater supplies and air quality. Recognize and protect the diversity of the Borough's land use development patterns including agricultural, residential, commercial, industrial and cultural resources, while limiting sprawl. New developments greater than five (5) units per acre should incorporate design standards that will protect and enhance the existing built and natural environment. The borough should actively limit sprawl through setting appropriate density standards and encouraging residential and commercial development to occur in areas that are centrally located and within close proximity to public and private services. ***Parks and other open spaces.*** These make a distinct contribution to the landscape and quality of life in the Borough. As the Borough experiences additional growth pressures, not only is the protection and development of such areas needed, but the equitable dispersion of parks and open space should be addressed. Consequently, the Borough should strategically and creatively position itself to deal with open space demands for various users. Currently, the Borough maintains a large number and diversity of parks, campgrounds and recreational areas. As the Borough's population continues to grow, the demand for various year-round passive and active recreational opportunities increases. ***Land-use Regulations.*** The Borough uses both Borough-wide and special use district zoning ordinances. Borough-wide zoning ordinances address land use issues that are common throughout the Borough and are most effectively and efficiently administered on a Borough-wide basis. ***Capital Improvement Plans.*** Although not technically a part of the Comprehensive Plan, Capital Improvement Plans, or Functional Plans, address in detail subjects more generally discussed in the Comprehensive Plan. Existing Borough functional plans include School District Plans, Trails and Recreation Plans, Borough Capital Projects, and Transportation Plans.	

I.2 FEDERAL AND STATE SPECIAL USE AREAS (PARKS, MONUMENTS, REFUGES/RESERVES, WILD AND SCENIC RIVERS, SPECIAL [RECREATION] MANAGEMENT AREAS)

I.2.1 Federal Special Use Areas

There are two Federal special use areas within the JPARC proposal area, the Delta and the Gulkana Wild and Scenic Rivers and Special Recreation Management Areas, which are described below.

BIRCH CREEK NATIONAL WILD RIVER

The Birch Creek National Wild River is managed by the BLM. Its upper reaches (approximately 80 river miles) lie within the Steese National Conservation Area. The entire designated portion of the river is approximately 126 miles long. The river is a principal recreation resource, with road access at two points separating an undisturbed river segment. River segments designated as "wild" are generally not accessible by road. Boaters can put in at Twelve Creek off the Steese Highway and float to a take-out point on the highway between the communities of Central and Circle. Other popular summer activities along the river include hiking, camping, sport hunting and fishing, recreational mining, and off-road vehicle use. Popular winter activities include cross-country skiing and snowmachining. Peak summer use occurs between May and July.

The Steese Highway Flight Avoidance Area (G), which goes from the surface to 2,000 feet above ground level (AGL) and is in effect year-round, overlies approximately 15 miles of the Birch Creek National Wild River.

DELTA WILD AND SCENIC RIVER AND DELTA RIVER SPECIAL RECREATION MANAGEMENT AREA

This area is administered by the BLM and originates south of the Denali Highway and includes the entire Upper and Lower Tangle Lakes, the Tangle River, and the Delta River. Access is along the Denali Highway about 21 miles west of the community of Paxson. Powerboats greater than 15 horsepower are not recommended. Aircraft are not recommended in the wild river corridor.

The Delta Wild and Scenic River (DWSR) is one of a few easily accessible Wild and Scenic Rivers in the State of Alaska, providing both day use and overnight boating opportunities. A wide range of outstanding recreational opportunities attract people to the DWSR. Some segments of the river corridor provide opportunities for river-related solitude, enjoyment of natural river sounds, and primitive and unconfined recreation in a natural, undisturbed environment. Other segments provide a remote setting for recreation activities such as wildlife viewing, fishing, hunting, trapping, camping, hiking, snowmachining, skiing, photography, OHV travel, and a variety of water for both the floater and motorized boater. Boating opportunities include both lake paddling and river paddling on clear and glacial water stretches, challenging whitewater, and opportunities for both day use and extended overnight backcountry excursions (BLM 2010).

The BLM in the East Alaska Resource Management Plan (EARMP) designated the Delta Wild and Scenic River corridor as a Special Recreation Management Area (SMRA). Specific recreation-related land use allocations and recreation management zones are designated within the Delta SMRA with objectives to maintain existing recreation opportunity spectrum classes that include primitive, semiprimitive nonmotorized, semiprimitive motorized, and roaded natural, with an emphasis on managing for a primitive experience in the portion of the Delta Wild and Scenic River corridor classified as wild.

The Delta National Wild and Scenic River Flight Avoidance Area (19) extends 5 nautical miles (nm) on either side of the river from the Denali Highway and Round Tangle Lake north almost to Darling Creek. It goes from the surface to 5,000 feet above mean sea level (MSL) and is in effect from 27 June to 11 July.

FORTYMILE NATIONAL WILD, SCENIC, AND RECREATIONAL RIVER

The Fortymile National Wild, Scenic and Recreational River is managed by the BLM. It is the largest designated network of a river and its tributaries in the National Wild and Scenic Rivers System. River segments designated as "wild" are intended to offer visitors a chance to experience solitude in a primitive setting. Segments designated "scenic" are mostly primitive with largely undeveloped shorelines; while "recreational" segments are road accessible and may be more developed.

The most commonly used "wild" segments of the Fortymile network include: 1) the Middle Fork from Joseph to the confluence with the North Fork, 2) the North Fork from its confluence with the Middle Fork to its confluence with the South Fork, and 3) the Mosquito Fork (of the South Fork) to Kechumstuk to the mouth. Power-boating also takes place on the navigable segments of the river network, including the South Fork, portions of the North Fork, and the Fortymile main stem. Sport hunting and fishing are also popular in the river drainage.

The BLM also operates the 60-acre Walker Fork Campground at mile 82 of the Taylor Highway. The campground has approximately 20 campsites and is popular for camping, fishing, and recreational gold panning. It is open from May through September. The Walker Fork portion of the Fortymile River is designated as "scenic."

There are no Flight Avoidance Areas over the Fortymile National Wild, Scenic, and Recreational River.

GULKANA NATIONAL WILD RIVER AND GULKANA RIVER SPECIAL RECREATION MANAGEMENT AREA (INCLUDING MIDDLE FORK AND WEST FORK)

This area is the largest clear-water river system in the Copper River Basin and is considered to be one of the most popular sport fishing streams in Alaska. The lakes have good populations of lake trout, turbot, and whitefish. Rivers and streams contain rainbow trout, arctic grayling, king salmon, red salmon, whitefish, long nose suckers, lamprey and steelhead. Other recreational activities in this area include kayaking, rafting, boating, hiking, camping, and wildlife viewing. Access is typically provided by trail, boat, or OHV.

Specific recreation-related land use allocations and recreation management zones are designated within the Gulkana National Wild River corridor with objectives to maintain existing recreation opportunity spectrum classes that include semiprimitive (upper river), primitive (Middle Fork and Upper West Fork), undeveloped (Sourdough), semiprimative motorized (Lower West Fork), and roaded natural, with an emphasis on managing for a primitive experience in the portion of the Delta Wild and Scenic River corridor classified as wild.

The Gulkana National Wild River Flight Avoidance Area (outside of MOAs) (36) extends 5 nm on either side of the main stem of the Gulkana River from the outlet of Paxson Lake south to the community of Sourdough. It goes from the surface to 5,000 feet above MSL and is in effect from 27 June to 11 July.

YUKON CHARLIE RIVERS NATIONAL PRESERVE

The Yukon-Charley Rivers National Preserve and the Charley National Wild River are managed by NPS. Floating the Yukon River is the primary recreational activity in the preserve (Air Force 1997). The Yukon River between Eagle and Circle is a popular 154-mile, 5- to 10-day float trip. Portions of the Kandik and Nation Rivers are also within the preserve and are floated as part of remote, fly-in trips. Limited floating occurs on the Charley River. Other types of recreational use (e.g., hiking) are low as most of the preserve is inaccessible. Concentrated areas of recreational use are along the major tributaries of the Yukon River: the Nation and Kandik Rivers and the first 5 to 10 miles of the Charley River. Cabins that visitors can use are concentrated along the Yukon River, with the Coal Creek/Slaven Cabin area receiving the highest visitor use. Other relatively high-use cabins (private cabins that can be used by the public) are located at Glenn Creek, the mouth of the Kandik River, Nation Bluff, and the mouth of the Charley River. The majority of the annual recreational use on the preserve occurs between June and August, with highest visitor use in June (Air Force 1997). Limited winter use takes place primarily from the communities of Circe and Central.

There are Flight Avoidance Areas over portions of the Charley, Kandik, and Yukon Rivers (17). These Flight Avoidance Areas extend 2 miles on either side of the rivers and from the surface to 2,000 AGL and are in effect from 15 April to 31 August. There is also a Flight Avoidance Area over the Ben Creek landing strip (H), located in the vicinity of Coal Creek and the Slaven Cabin on the Yukon River. It extends in a 3-mile radius around the landing strip, goes from the surface to 1,500 feet AGL, and is in effect year-round.

YUKON FLATS NATIONAL WILDLIFE REFUGE

The Yukon Flats National Wildlife Refuge is managed by the USFWS. The refuge is a remote and roadless area; access is limited to boats along the Yukon River and its tributaries and by small aircraft. There are no recreational facilities or developed resources for visitors. The primary recreation activities are river floating and sport hunting. Birch Creek and the Yukon River are popular float destinations. There are no floating designations in the portion of the refuge located beneath the Yukon 4 MOA. Some recreational floating occurs on the Yukon River between Circle and Fort Yukon and the Black River between the Salmon Fork and Chalkyitsik. Summer uses occur between late May and September.

There are no Flight Avoidance Areas over the Yukon Flats National Wildlife Refuge.

I.2.2 State Special Use Areas

For purposes of this EIS, State Special Use Areas are those areas legislatively designated by the State of Alaska and may include refuges, sanctuaries, critical habitat areas, ranges, special management areas, forests, parks, recreation areas, preserves, public use areas, and recreation rivers. There are six state special use areas within the JPARC action area, which are described below.

BIG DELTA STATE HISTORICAL PARK

Big Delta State Historical Park is a 10-acre park located 8 miles north of Delta Junction off Richardson Highway. Amenities include campsites, picnic area, trails, and a museum (ADNR 2011d). Specific use data were not available.

BIRCH LAKE STATE RECREATION SITE

The Birch Lake State Recreation Site (SRS) is 58 miles south of Fairbanks off the Richardson Highway. It offers campsites and unimproved boat launch and is a popular fishing area. The lake is popular with fishers, jet-skiers, and water skiers in the summer and with snowmachiners and ice fishers in the winter. There is fishing all year for stocked species, including rainbow trout, king and silver salmon, grayling, and arctic char (ADNR 2011e). Specific use data were not available.

The Birch Lake SRS Flight Avoidance Area (10) extends in a 1-mile radius around the SRS, goes from the surface to 2,000 feet AGL, and is in effect from 15 May to 30 September.

CHENA RIVER STATE RECREATION AREA

The Chena River State Recreation Area (SRA) is managed by the Alaska Division of Parks and Outdoor Recreation. The SRA encompasses more than a quarter million acres of rolling hills and is located east of the North Pole community, approximately 30 miles east of Fairbanks, and is easily accessible from the Chena Hot Springs Road, making it a popular year-round use area. The Chena Hot Springs Road is the only paved road that provides access to the SRA. There is no public transportation to the SRA. Two RS 2477 rights-of-way exist within the SRA (ADNR 2006). One is the Chena Hot Springs Winter Trail (RST 278), and the other is a winter trail that runs east on the East Fork of the Chena River (RST 46). Both of these trails are primarily used in the winter months.

The park is located along the Chena River, which is available for kayaking, canoeing, and fishing, particularly for arctic grayling. There are three developed campgrounds and camping is also permitted in undeveloped areas along gravel bars and river access roads. Public cabins are also available and the park is open to biking, all-terrain vehicles, and horses. Other attractions include hunting, biking, all-terrain vehicles, horseback riding, and rock climbing. In the winter, snowmachining and ski touring is permitted. The park also hosts two dog sled races on the Chena Hot Springs Winter Trail. Total visitor use in fiscal year 2004 was 163,900 and the majority of use occurs during the summer months (ADNR 2006).

The Chena Recreation Area Flight Avoidance Area (2) overlies most of the SRA and goes from the surface to 1,500 feet AGL. It is in effect from 1 May to 30 September.

CLEARWATER STATE RECREATION SITE

The Clearwater SRS is a campground located off Richardson Highway that has campsites, a boat launch, and a picnic area. Popular activities include fishing, boating, and wildlife viewing (ADNR 2011f). The Delta Clearwater River provides access to the Tanana and Goodpaster Rivers. Specific use data were not available.

CREAMER'S FIELD MIGRATORY WATERFOWL REFUGE

Creamer's Refuge protects and enhances quality habitat for a diversity of wildlife, especially waterfowl and other migratory birds, while also providing for compatible public uses, such as wildlife viewing, research, and nature education (ADFG 2011a). Specific use data were not available.

DELTA JUNCTION BISON RANGE AREA

The Delta Junction Bison Range Area is located approximately 12 miles southeast of Delta Junction on the Richardson Highway. The 90,000-acre Delta Junction State Bison Range was established in 1979 to perpetuate free-ranging bison by providing adequate winter range and to alter seasonal movements of bison to reduce damage to agriculture. The bison range is managed for a wide variety of public uses including timber sales, hunting, cross-country skiing, dog sledding, trapping, wildlife viewing, and fishing (ADFG 2011b). The best bison viewing on the range is from mid-July to mid-September. Specific use data were not available.

DELTA STATE RECREATIONAL SITE

The Delta SRS is located near Delta Junction off the Richardson Highway. It is a campground and includes campsites and a picnic area. A city airstrip next to the site allows for fly-in camping (ADNR 2011g). Specific use data were not available.

DONNELLY CREEK STATE RECREATIONAL SITE

The Donnelly Creek SRS is located 126 miles south of Fairbanks off the Richardson Highway on the Delta River. It has campsites, picnic sites, and a trail. It is primarily a camping facility and does not support other specific recreation activities in the immediate vicinity. Popular activities include fishing and day use (ADNR 2011h). Specific use data were not available.

The Donnelly Creek State Recreation Flight Avoidance Area (24) extends in a 1-mile radius around the SRS, goes from the surface to 2,000 feet AGL, and is in effect from 15 May to 30 September.

FIELDING LAKE STATE RECREATIONAL SITE

The 600-acre Fielding Lake SRS, located off the Richardson Highway, is a scenic campground with campsites, a boat launch, a public use cabin, and access to fishing. The fish population in Fielding Lake is natural and not stocked and includes arctic grayling, lake trout, and burbot (ADNR 2011i).

The Fielding Lake SRS Flight Avoidance Area (outside of MOAs) (23) extends in a 1-mile radius around the SRS, goes from the surface to 2,00 feet AGL, and is in effect from 15 May to 30 September. In addition, the Delta National Wild and Scenic River Flight Avoidance Area

(19) extends west from the Fielding Lake SRS for about 10 miles, goes from the surface to 5,000 feet above MSL, and is in effect from 27 June to 11 July.

HARDING LAKE STATE RECREATIONAL AREA

The Harding Lake SRA is located off the Richardson Highway, about 42 miles south of Fairbanks. The facility includes campsites, boat launches, picnic sites, a trail, and ball fields (ADNR 2011j). Summer activities are picnicking, boating, hiking, and sportfishing; winter activities include ice fishing, ice skating, cross-country skiing, and snowmachining. Specific use data were not available.

The Salcha River Area One Flight Avoidance Area (4) overlies this SRA and extends east roughly 22 miles up the Salcha River from the highway. It goes from the surface to 1,500 feet AGL and is in effect year-round.

LAKE LOUISE STATE RECREATION AREA

The Lake Louise SRA is located near Glennallen in the Copper Valley. Area activities include camping, fishing, boating, bird watching, hiking, biking, berry picking, snowmachining, skiing, skating, hunting, and Northern Lights viewing. Users fish year-round for lake trout, whitefish, burbot, and arctic grayling. Wildlife viewing opportunities include moose, wolf, bear, fox, sheep, lynx, and the annual migration of the Nelchina caribou herd each October through November (ADNR 2011k). Specific use data were not available.

There are no Flight Avoidance Areas over the Lake Louise State Recreation Area.

MATANUSKA VALLEY MOOSE RANGE

The Matanuska Valley Moose Range is located on approximately 132,500 acres in south-central Alaska and was established to maintain, improve, and enhance moose populations and habitat and other wildlife resources of the area, as well as perpetuate public use of the area including fishing, grazing, forest management, hunting, raping, mineral and coal entry, and development (ADNR and ADFG 1986b). ADNR manages the surface and subsurface resources on the range while ADFG manages the fish and wildlife.

There are no Flight Avoidance Areas over the Matanuska Valley Moose Range.

NELCHINA PUBLIC USE AREA

The Nelchina Public Use Area covers approximately 2.4 million acres in the Talkeetna Mountains of south-central Alaska. The area was created to protect fish and wildlife habitat, perpetuate and enhance public enjoyment of fish and wildlife and their habitat, and perpetuate and enhance additional public uses. Most access to this area is along an extensive ORV and foot trail system that starts from the Glenn Highway. Float planes and ski planes also land on lakes in the area. Motorboats are used along rivers to reach parts of the area. Uses include hunting, fishing, trapping, hiking, camping, boating, and aircraft landing (ADNR 2000).

There are no Flight Avoidance Areas over the Nelchina Public Use Area.

QUARTZ LAKE STATE RECREATION AREA

The Quartz Lake SRA is a 600-acre park located 10 miles north of Delta Junction off Richardson Highway. The SRA includes campsites, public use cabins, boat lunches, fishing dock, picnic sites, swimming area, and volleyball court. Summer activities include wildlife viewing, camping, picnicking, swimming, water skiing, and hiking; winter activities include ice fishing, snowmachining, dog mushing, skiing, and snowshoeing. Fishing is the primary activity at Quartz Lake SRA. Each year more than 34,000 fish are harvested (ADNR 2011l). ADFG stocks Quartz Lake annually with rainbow trout and coho salmon and biennially with arctic char and chinook salmon. Lost Lake is stocked annually with rainbow trout by ADFG.

SALCHA RIVER STATE RECREATION SITE

The Salcha River SRS is located off the Richardson (Alaska) Highway approximately 40 miles south of Fairbanks. Amenities include campsites, a public use cabin, boat launches, and picnic facilities. Primary summer activities include camping, picnicking, boating, and sportfishing (Air Force 1997). King salmon, arctic grayling, and northern pike are the most common species of fish caught in the Salcha River (ADNR 2011m). A winter trail for snowmachine use extends up the Salcha River from the SRS. Specific use data were not available.

The Salcha River Area One Flight Avoidance Area (4) overlies this SRS and extends east roughly 22 miles up the Salcha River from the highway. It goes from the surface to 1,500 feet AGL and is in effect year-round. A second Flight Avoidance Area, the Salcha River Area Two (5), extends approximately another 21 miles farther up the Salcha River, goes from the surface to 1,000 feet AGL, and is in effect year-round.

TANANA VALLEY STATE FOREST

The Tanana Valley State Forest is managed by the Alaska Division of Forestry. It comprises over 1.8 million acres in the east-central part of Alaska. Timber production is the major commercial activity. The forest is also open to mining, gravel extraction, oil and gas leasing, and grazing, although very little is done (ADNR 2011n). While the primary use of these lands is forestry, recreational use also occurs, including hunting, fishing, trapping, camping, hiking, dog mushing, cross-country skiing, wildlife viewing, snow machining, boating, and berry picking (ADNR 2011n). Specific use data were not available.

The following Flight Avoidance Areas cover portions of the Tanana Valley State Forest, although none were established specifically for that purpose:

- The Pleasant Valley Subdivision Flight Avoidance Area (1) overlies a portion of the forest. The Flight Avoidance Area goes from the surface to 3,000 feet AGL and is in effect year-round.
- Clear Creek Cabins Flight Avoidance Area (8), which extends in a 1-mile radius around a group of cabins located south of the Richardson Highway and the Tanana River, goes from the surface to 1,500 feet AGL, and is in effect year-round.
- Healy Lake/Village Flight Avoidance Area (22), which extends in a 3-mile radius around Healy Lake and the Healy Lake community, goes from the surface to 6,000 feet above MSL, and is in effect year-round.

- Lake George Flight Avoidance Area (28), which extends in a 2-mile radius around Lake George and a portion of Moosehead Lake, goes from the surface to 1,500 feet AGL, and is in effect year-round.
- Shaw Creek Youth Camp Flight Avoidance Area (29), which extends in a 1-mile radius around the Shaw Creek area on the Richardson Highway, goes from the surface to 1,500 feet AGL, and is in effect year-round.

I.3 FISH AND GAME MANAGEMENT

ADFG Game Management Units (GMUs)

The ADFG administers the state's GMUs and oversees the harvest of game species in them. Typical game species regulated within the GMUs include bison, black bear, brown/grizzly bear, caribou, Dall sheep, Sitka black-tailed deer, elk, moose, mountain goat, muskox, small game, and waterfowl. A brief description of the GMUs and subunits underlying the proposed action area for this EIS is provided below. Detailed information on the hunting regulations and restrictions within each of the GMUs is included. Current regulations and restrictions can be found on the ADFG website (http://www.adfg.alaska.gov/index.cfm?adfg= huntingmaps.gmuinfo).

GMU 9B (Alaska Peninsula)

GMU 9B consists of the Kvichak River drainage, except those lands drained by the Kvichak River and Kvichak Bay between the Alagnak River drainage and the Naknek River drainage. Game species that can be taken in this GMU include black bear, brown/grizzly bear, caribou, moose, sheep, wolf, and wolverine. There are no SRAs within this GMU.

GMU 12 (Upper Tanana-White River)

Game Management Unit 12 consists of the Tanana River drainage upstream from the Robertson River, including all drainages into the east bank of the Robertson River, and the White River drainage in Alaska but excluding the Ladue River drainage. Game species that can be taken in this GMU include black bear, brown/grizzly bear, caribou, moose, sheep, wolf, and wolverine. A portion of the Tok Management Area is located within this GMU. This area is open to sheep hunting by permit only.

GMU 13A, B, C, and E (Nelchina-Upper Susitna)

This GMU covers Nelchina and Upper Susitna including the portions of the Copper River, Gulkana River, and Gakona River. Game species that can be taken in these GMUs include black bear, brown/grizzly bear, caribou, moose, sheep, wolf, and wolverine. Several SRAs are located within these GMUs. Sheep Mountain Closed Area is located in GMU 13A. Clearwater Creek Controlled Use Area, Paxon Closed Area, Sourdough Controlled Use Area, Tangle Lakes Archaeological District, and Delta Controlled Use Area are located within GMU 13 B. A portion of the Tok Management Area is located in GMU 13C. Denali Sate Park is located within GMU 13E.

GMU 14A and B

This GMU covers portions of Turnagain Arm, Knik Arm Susitna River Talkeetna River, Chickaloon River, and drainages into the north side of Cook Inlet. Game species that can be taken in these GMUs include black bear, brown/grizzly bear, caribou, goat, moose, sheep, wolf, and wolverine. There are several SRAs within these GMUs. Palmer-Wasilla Management Area, Susitna Flats Game Refuge, Palmer Hay Flats State Game Refuge, Goose Bay State Game Refuge, and Nancy Lake State Recreation Area are located within GMU 14A. The Willow Mountain Critical Habitat Area is located in GMU 14B.

GMU 16A and B (Matanuska-Susitna Valley)

This GMU includes the drainages into Cook Inlet between Redoubt Creek and the Susitna River, drainages into the west side of the Chulitna River, and drainages into the south side of the Tokositna River upstream to the base of the Tokositna Glacier. Game species that can be taken in these GMUs include black bear, brown/grizzly bear, caribou, moose, sheep, wolf, and wolverine. Three SRAs (Susitna Flats Game Refuge, Trading Bay State Game Refuge, and Redoubt Bay Critical Habitat Area) are located in GMU 16B. There are no SRAs in GMU 16A.

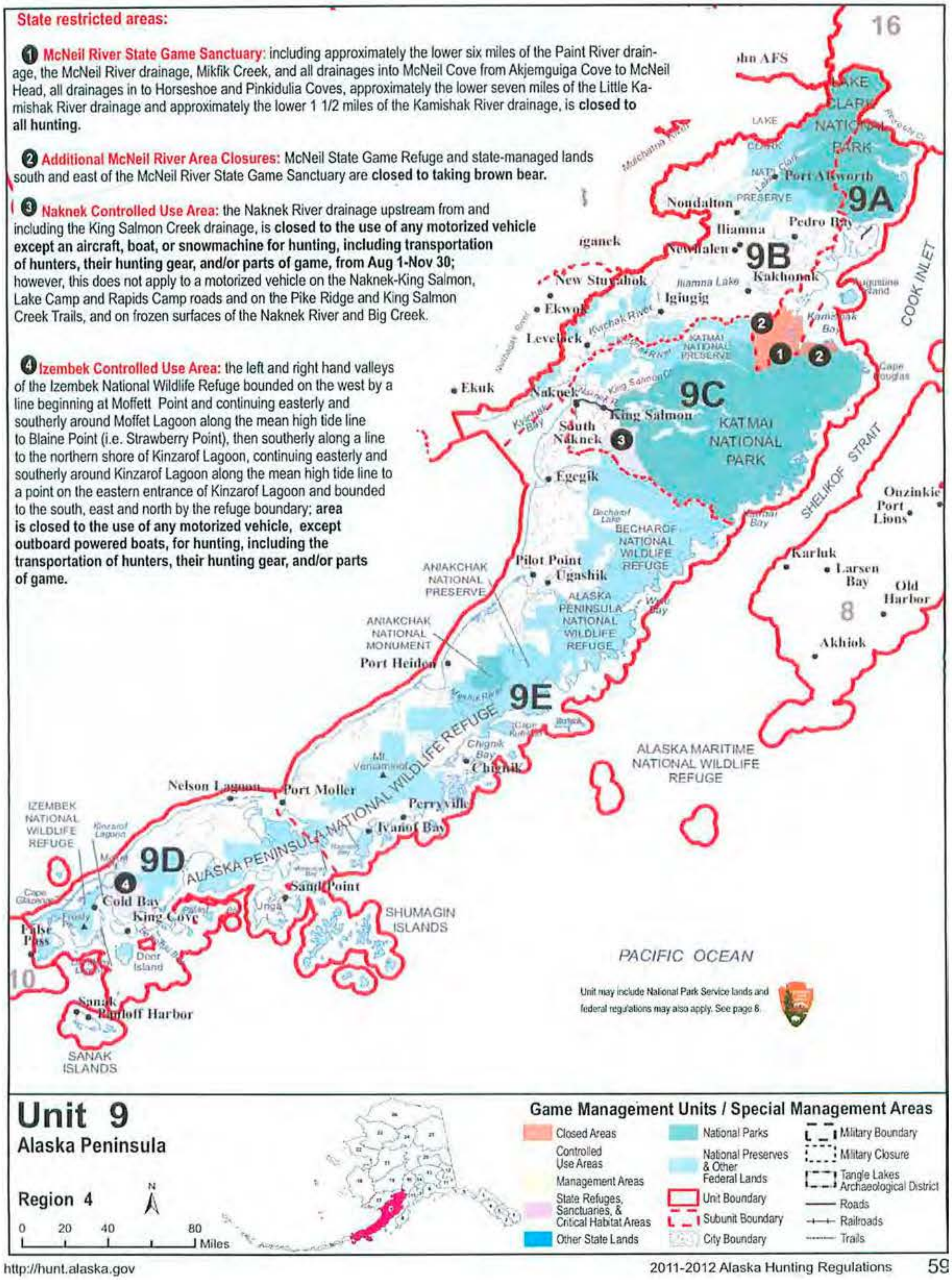
GMU 19A, B, C, and D

This GMU covers all drainages into the Kuskokwim River upstream from a straight line drawn between Lower Kalskag and Paimiut. Game species that can be taken in these GMUs include black bear, brown/grizzly bear, bison, caribou, moose, sheep, wolf, and wolverine. There are several SRAs within GMU 19A, including a Lime Village Management Area, Nonresident Closed Areas, and a portion of the Holitna-Hoholitna Controlled Use Area. The Upper Holitna-Hoholitna Management Area, a portion of the Holitna-Hoholitna Controlled Use Area, and a Nonresident Closed Area are located within GMU 19B. There are no SRAs within GMU 19 C and one (Upper Kuskokwim Controlled Use Area) within GMU 19D.

GMU 20A, B, D, and E

GMU 20 consists of the Yukon River drainage upstream from and including the Tozitna River drainage to and including the Hamlin Creek drainage, drainages into the south bank of the Yukon River upstream from and including the Charley River drainage, the Ladue River and Fortymile River drainages and the Tanana River drainage north of Unit 13 and downstream from the east bank of the Robertson River. GMU 20 is divided into six subunits: Unit 20A through 20F. Game species managed within GMU 20 include caribou, bison, moose, Dall sheep, brown/grizzly bear, and black bear.

There are several SRAs within these GMUs. SRAs within GMU 20A include ferry Trail Management Area, Healy-Lignite Management Area, Wood River Controlled Use Area, and Yanert Controlled Use Area. SRAs within GMU 20B include Lost Lake Controlled Area, Birch Lake Closed Area, Fairbanks Management Area, Creamer’s Field Migratory Waterfowl Refuge, Minto Flats Management Area, and a portion of Minto Flats State Game Refuge. SRAs within GMU 20D include Delta Junction Management Area, Delta Controlled Use Area, Bison Range Youth Hunt Management Area, Macomb Plateau Controlled Use Area, and a portion of Tok Management Area. The Ladue River Controlled Use Area and the Glacier Mountain Controlled Use Area are located in GMU 20E.



Source: ADFG 2011c.

Unit 9 Alaska Peninsula

See map on page 59 for state restricted areas in Unit 8.

The Alaska Peninsula and adjacent islands, including drainages east of False Pass, Pacific Ocean drainages west of and excluding the Redoubt Creek drainage, drainages into the south side of Bristol Bay, drainages into the north side of Bristol Bay east of Etolin Point, and including the Sanak and Shumagin islands, and all seaward waters and lands within three (3) miles of these coastlines;
Unit 9A: that portion of Unit 9 draining into Shelikof Strait and Cook Inlet between the southern boundary of Unit 16 (Redoubt Creek) and the northern boundary of Katmai National Park and Preserve;
Unit 9B: Kvichak River drainage, except lands drained by Kvichak River/Bay between Alagnak River drainage and Naknek River drainage.
Unit 9C: Alagnak (Branch) River drainage, Naknek River drainage, lands drained by Kvichak River/Bay between Alagnak River drainage and Naknek River drainage, and all land and water within Katmai National Park & Preserve;
Unit 9D: all Alaska Peninsula drainages west of a line from the southernmost head of Port Moller to the head of American Bay, including the Shumagin Islands and other islands of Unit 9 west of the Shumagin islands;
Unit 9E: the remainder of Unit 9.

OPEN TO: **R** = RESIDENTS ONLY | **B** = RESIDENTS AND NONRESIDENTS | **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear		*• See pages 25-27 for bear information and salvage requirements.*		
B	9	**Three bears**		no closed season
Brown/Grizzly Bear		*• Nonresident hunters must be accompanied by a guide, see page 10. • See pages 25-27 for additional bear hunting information. • Evidence of sex must remain naturally attached to the hide.*		
B	9A 9C 9D 9E	**One bear** *every four regulatory years by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning July 1*	RB368	Oct 1-Oct 21
		OR		
B	9A 9C 9D 9E	**One bear** *every four regulatory years by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Apr 1*	RB370	May 10-May 25
B	9B	**One bear** *every four regulatory years by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning July 1*	RB369	Sept 20-Oct 21
		OR		
B	9B	**One bear** *every four regulatory years by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Apr 1*	RB370	May 10-May 25
		Resident brown bear hunting near villages in Unit 9 is by registration permit only; no tag required.		
R	9 *near villages*	**One bear** *every regulatory year by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning July 1*	RB525	no closed season
		In addition to other regulations, subsistence regulations apply to the following "Residents Only" hunts (see page 26)		
R	9B	**One bear** *contact King Salmon for permit availability.*	RB502	Sept 1-May 31
R	9E *all drainages into the Pacific Ocean between Cape Kumliun and border of Unit 9E and 9D*	**One bear** *contact King Salmon for permit availability.*	RB502	Nov 1-Dec 31
Caribou		*• Proxy hunting restrictions apply, see page 12. • In areas indicated by a ✪ federal restrictions exist, see page 8. • In bag limit, "caribou" means an animal of either sex; "bull" means male caribou. • Meat taken in Unit 9B prior to October 1 must remain on the bones of the front quarters and hindquarters until removed from the field or processed for human consumption. • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
R	9A ✪ 9B 9C *that portion within the Alagnak River drainage*	**Two caribou** - *no more than one bull may be taken; no more than one caribou may be taken from Aug 1-Jan 31*	HT	Aug 1-Mar 15
R	9C *that portion north of the Naknek River and south of the Alagnak River drainage*	**One caribou** *by permit available in person in King Salmon if a winter season is announced*	RC504	may be announced
B	9D			no open season
B	9C 9E *remainder* ✪			no open season

**Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.*

60 2011-2012 Alaska Hunting Regulations — effective July 1, 2011 through June 30, 2012

Source: ADFG 2011c.

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Moose		• *In areas indicated by a* ✪ *federal restrictions exist, see page 8. Online permits available at http://hunt.alaska.gov* • *In bag limit, "moose" means an animal of either sex; "bull" means a male moose.* • *50-inch antlers and brow tines defined on pages 33-34.* • *In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.* • *Meat taken in Unit 9B, prior to Oct 1 must remain on the bones of the front quarters and hindquarters, until removed from the field or is processed for human consumption.*		
R	9A	**One bull** *by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Aug 17*	RM271	Sept 1-Sept 15
N	9A	**One bull** *by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Aug 17*	RM281	Sept 5-Sept 15
R	9B	**One bull** *by permit available in person in Unit 9B villages and in King Salmon beginning Aug 17, contact King Salmon for additional information* OR	RM272	Sept 1-Sept 15
R	9B	**One antlered bull** *by permit available in person in Unit 9B villages and in King Salmon beginning beginning Dec 1, contact King Salmon for additional information*	RM272	Dec 15-Jan 15
N	9B	**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side by permit available in person in Unit 9B villages and in King Salmon beginning Aug 17, contact King Salmon for additional information*	RM282	Sept 5-Sept 15
R	9C	that portion draining into the ✪ Naknek River: **One bull** *by permit in person in King Salmon beginning Aug 17* OR	RM272	Sept 1-Sept 20
R	9C	that portion draining into the ✪ Naknek River: **One antlered bull** *by permit in person in King Salmon beginning Nov 16*	RM272	Dec 1-Dec 31
N	9C	that portion draining into the ✪ Naknek River: **One bull** *with 50-inch antlers or antlers with 3 or more brow tines on at least one side by permit in person in King Salmon beginning Aug 17*	RM282	Sept 5-Sept 20
R	9C	remainder ✪: **One bull** *by permit available in person in King Salmon beginning Aug 17* OR	RM272	Sept 1-Sept 20
R	9C	remainder ✪: **One antlered bull** *by permit available in person in King Salmon beginning Dec 1*	RM272	Dec 15-Jan 15
N	9C	remainder ✪: **One bull** *with 50-inch antlers or antlers with 3 or more brow tines on at least one side by permit available in person in King Salmon beginning Aug 17*	RM282	Sept 5-Sept 20
R	9D	**One antlered bull** *by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Dec 1*	RM271	Dec 15-Jan 20
N	9D			no open season
R	9E	**One bull** *with spike-fork or 50-inch antlers or antlers with 3 or more brow tines on at least one side by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Sept 1* OR	RM271	Sept 10-Sept 25
R	9E	**One antlered bull** *by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Nov 16*	RM271	Dec 1-Jan 20
N	9E	**One bull** *with 50-inch antlers or antlers with 3 or more brow tines on at least one side by permit available online at http://hunt.alaska.gov and in person in King Salmon beginning Sept 1*	RM281	Sept 10-Sept 25
Sheep		• *Nonresident hunters must be accompanied by a guide, see page 10.* • *See definition of full-curl horn and drawings on page 31. Horns must accompany meat from the field.* • *Ram horns must be sealed within 30 days of kill.*		
B	9	**One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
Wolf		***A portion of this unit is within a predator control area and special regulations apply. See predator control supplement.*** • *Hides must be sealed within 30 days of kill.* • *No nonresident tag required.* ***Supplement available online at http://hunt.alaska.gov***		
B	9	**Ten wolves** *per day*		Aug 10-June 30
Wolverine		• *Hides must be sealed within 30 days of kill.*		
B	9	**One wolverine**		Sept 1-Mar 31

OPEN TO: R = RESIDENTS ONLY; B = RESIDENTS AND NONRESIDENTS; N = NONRESIDENTS ONLY

Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.

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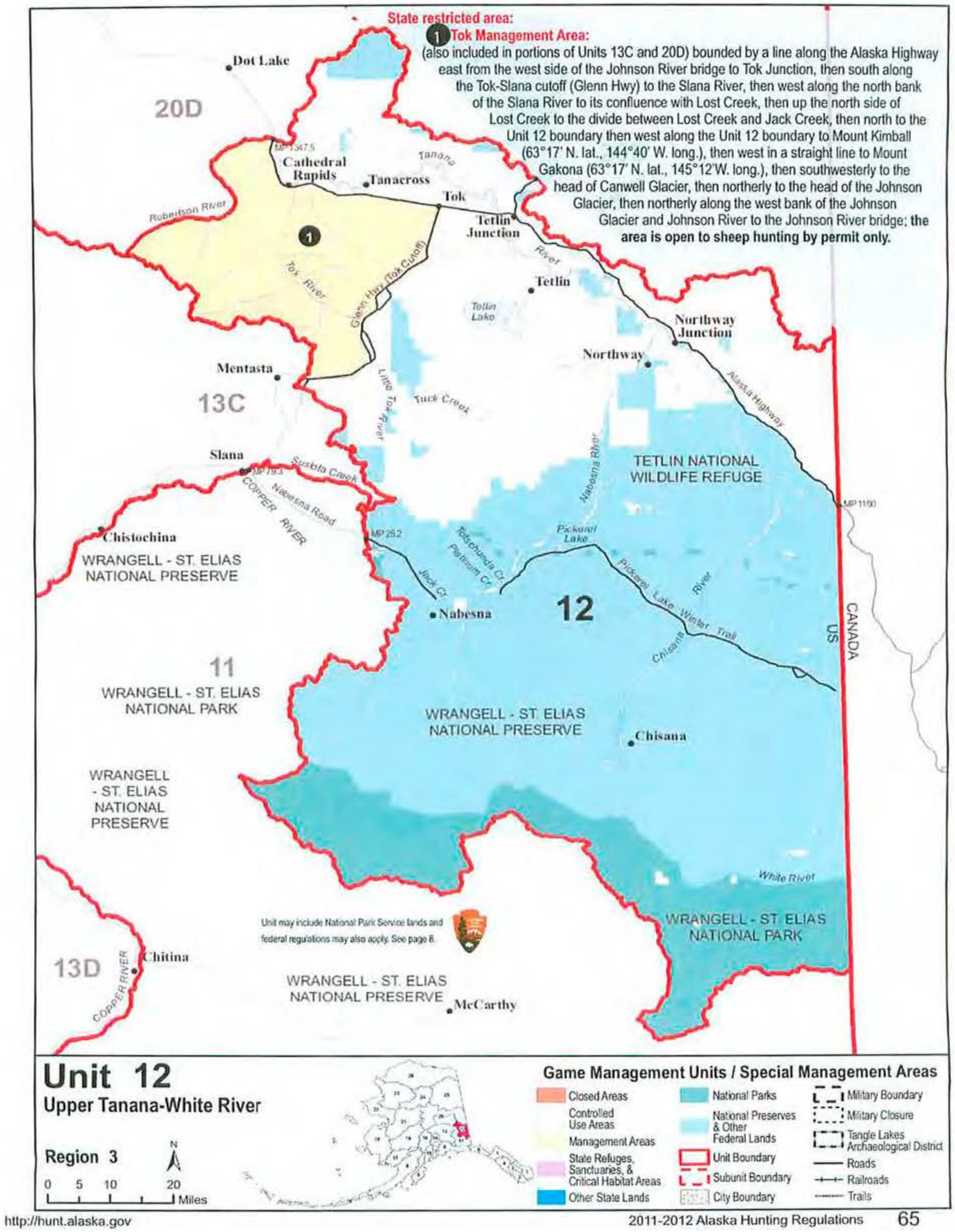
Source: ADFG 2011c.



Source: ADFG 2011c.

Unit 12 Upper Tanana-White River

Tanana River drainage upstream from the Robertson River, including all drainages into the east bank of the Robertson River, and the White River drainage in Alaska, but excluding the Ladue River drainage.

See map page 65 for state restricted areas in Unit 12.

OPEN TO: **R** = RESIDENTS ONLY **B** = RESIDENTS AND NONRESIDENTS **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA		BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear			*• See pages 25-27 for bear information and salvage requirements.*		
B	12		**Three bears**	HT	no closed season
Brown/Grizzly Bear			*• No resident tag required.* *• See pages 25-27 for additional bear hunting information.* *• Nonresident hunters must be accompanied by a guide, see page 10.* *• Evidence of sex must remain naturally attached to the hide.*		
B	12		**One bear** *every regulatory year*		Aug 10-Jun 30
Caribou			*• In bag limit "caribou" means an animal of either sex; "bull" means male caribou* *• In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
R	12	*west of the Glenn Highway (Tok Cutoff) and south of the Alaska Highway within the Tok River drainage*	**One bull**	HT	Sept 1-Sept 20
R	12	*west of the Glenn Highway (Tok Cut-off) and south of the Alaska Highway excluding the Tok River drainage (Macomb Herd)*	**One bull** *by permit available online at http://hunt.alaska.gov or in person in Delta Junction, Tok, and Fairbanks beginning Aug 3.*	RC835	Aug 10-Aug 27
B	12	*remainder*			no open season
Moose			*• Spike-fork, 50-inch antlers, and brow tines defined on page 33-34.* *• In bag limit, "moose" means an animal of either sex; "bull" means a male moose.* *• In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
R	12	*that portion including all drainages into the west bank of the Little Tok River, from its headwaters in Bear Valley at the intersection of the unit boundaries of Units 12 and 13 to its junction with the Tok River, and all drainages into the south bank of the Tok River from its junction with the Little Tok River to the Tok Glacier*	**One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Aug 24-Aug 28 Sept 8-Sept 17
R	12		**One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*	CM300	Aug 24-Aug 28 Sept 8-Sept 17
N	12		**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 8-Sept 17
R	12	*remainder of that portion in the Tok River drainage up-stream from the Tok Cutoff Bridge, including the Little Tok River drainage*	**One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Aug 24-Aug 28 Sept 8-Sept 17
N	12		**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 8-Sept 17
B	12	*east of the Nabesna River and south of the winter trail running southeast from Pickerel Lake to the Canadian border*	**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 1-Sept 30

**Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.*

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Source: ADFG 2011c.

OPEN TO: **R** = RESIDENTS ONLY | **B** = RESIDENTS AND NONRESIDENTS | **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Moose *continued*				
R	12 remainder	**One bull**	HT	Aug 24-Aug 28 Sept 8-Sept 17
N	12 remainder	**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 8-Sept 17
Sheep		• *Nonresident hunters must be accompanied by a guide, see page 10.* • *See definition of full-curl horn and drawings on page 31.* • *Horns must accompany meat from the field.* • *Ram horns must be sealed within 30 days of kill.*		
B	12 within Tok Management Area	**One ram** *with full-curl horn or larger every four regulatory years by permit*	DS102	Aug 10-Aug 25
B	12 within Tok Management Area	**One ram** *with full-curl horn or larger every four regulatory years by permit*	DS103	Aug 26-Sept 20
B	12 remainder	**One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
Wolf		***A portion of this unit is within a predator control area and special regulations apply. See predator control supplement.*** • *Hides must be sealed within 30 days of kill.* • *No nonresident tag required.* *Supplement available online at http://hunt.alaska.gov*		
B	12	**Five wolves**		Aug 10-May 31
Wolverine		• *Hides must be sealed within 30 days of kill.*		
B	12	**One wolverine**		Sept 1-Mar 31

*Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.


Braydon Masneri, age 12, and his dad Norm, both harvested their caribou in Unit 13.


Ava Ingebrigtsen, age 7, harvested her first big game animal under her father's bag limit while on a father/daughter hunt.

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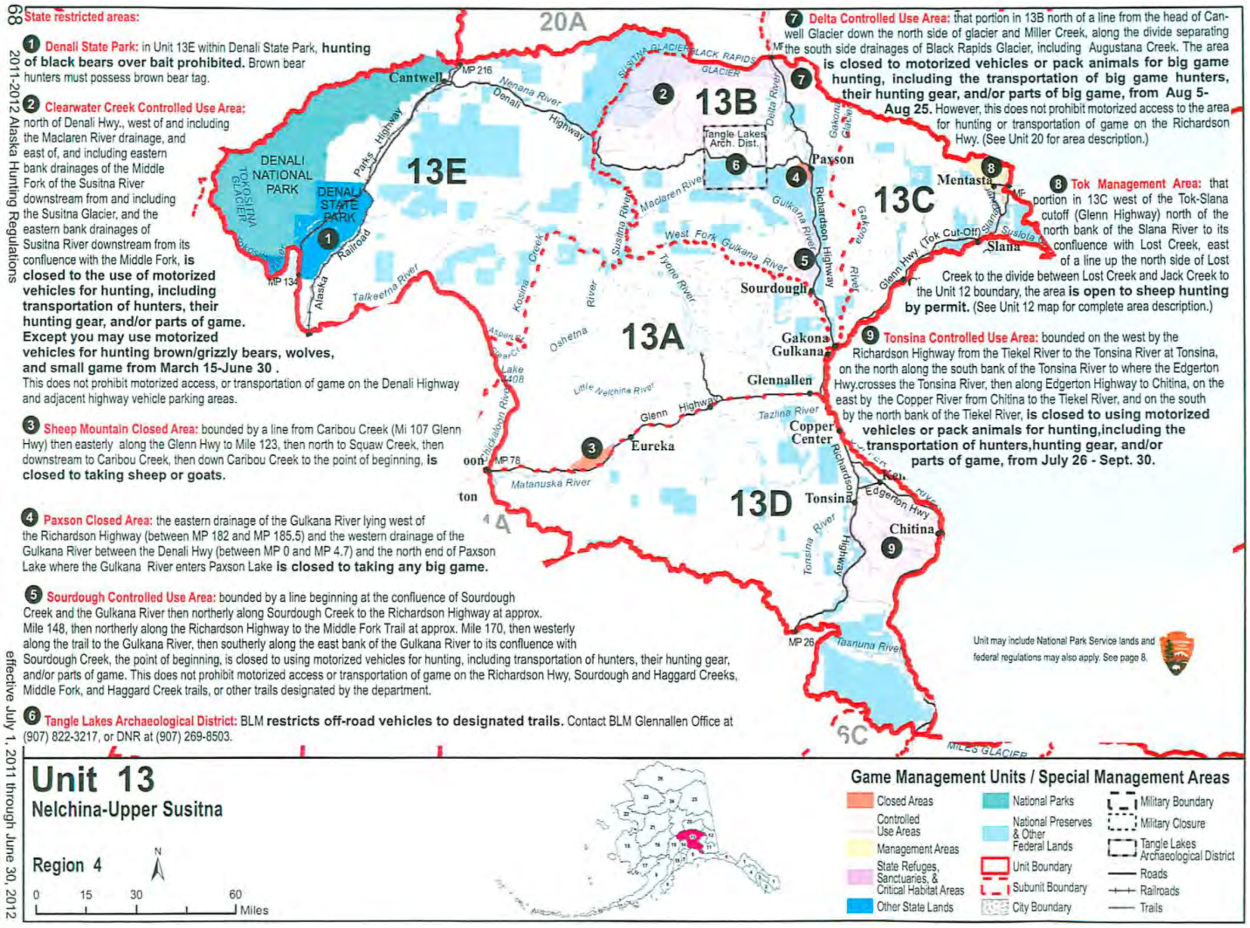
Source: ADFG 2011c.



Source: ADFG 2011c.

Unit 13 Nelchina-Upper Susitna

See map on page 68 for state restricted areas in Unit 13

Unit 13: That area westerly of the easternmost bank of the Copper River from Miles Glacier north to the confluence with the Slana River, then along the east bank of the Slana River to Suslota Creek, and that area of the Slana River drainage north of the south bank of Suslota Creek; the drainages into the Delta River upstream from Falls Creek and Black Rapids Glacier; the drainages into the Nenana River upstream from the southeast corner of Denali National Park at Windy; the drainage into the Susitna River upstream from its junction with the Chulitna River; the drainage into the east bank of the Chulitna River upstream to its confluence with Tokositna River; the drainages of the Chulitna River (south of Denali National Park) upstream from its confluence with the Tokositna River; the drainages into the north bank of the Tokositna River upstream to the base of the Tokositna Glacier; the drainages into the Tokositna Glacier; the drainages into the east bank of the Susitna River between its confluence with the Talkeetna and Chulitna Rivers; the drainages into the north and east bank of the Talkeetna River and including the Talkeetna River, to its confluence with Clear Creek, the eastside drainages of a line going up the south bank of Clear Creek to the first unnamed creek on the south, then up that unnamed creek to lake 4408, along the northeast shore of lake 4408, then southeast in a straight line to the northernmost fork of the Chickaloon River; the drainages into the east bank of the Chickaloon River below the line from lake 4408; the drainages of the Matanuska River above its confluence with the Chickaloon River;
Unit 13A: bounded by a line beginning at the Chickaloon River bridge at Mile 77.7 on the Glenn Highway, then along the Glenn Highway to its junction with the Richardson Highway, then east to the east bank of the Copper River, then northerly along the east bank of the Copper River to its junction with the Gulkana River, then northerly along the west bank of the Gulkana River to its junction with the West Fork of the Gulkana River, then westerly along the west bank of the West Fork of the Gulkana River to its source, an unnamed lake, then across the divide into the Tyone River drainage, down an unnamed stream into the Tyone River, then down the Tyone River to the Susitna River, then down the southern bank of the Susitna River to the mouth of Kosina Creek, then up Kosina Creek to its headwaters, then across the divide and down Aspen Creek to the Talkeetna River, then southerly along the boundary of Unit 13 to the Chickaloon River bridge, the point of beginning;
Unit 13B: bounded by a line beginning at the confluence of the Copper River and the Gulkana River, then up the east bank of the Copper River to the Gakona River, then up the east bank of the Gakona River and Gakona Glacier to the boundary of Unit 13, then westerly along the boundary of Unit 13 to the Susitna Glacier, then southerly along the west bank of the Susitna Glacier and the Susitna River to the Tyone River, then up the Tyone River and across the divide to the headwaters of the West Fork of the Gulkana River, then down the West Fork of the Gulkana River to the confluence of the Gulkana River and the Copper River, the point of beginning;
Unit 13C: Unit 13 east of the east bank of the Gakona River and Gakona Glacier;
Unit 13D: Unit 13 south of Unit 13A;
Unit 13E: the remainder of Unit 13.

OPEN TO: **R** = RESIDENTS ONLY **B** = RESIDENTS AND NONRESIDENTS **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear		*• See pages 25-27 for bear information and salvage requirements.*		
B	13	**Three bears**	HT	no closed season
Brown/Grizzly Bear		*• No resident tag required, except in Denali State Park.* *• Nonresident hunters must be accompanied by a guide, see page 10.* *• See pages 25-27 for additional bear hunting information.* *• Evidence of sex must remain naturally attached to the hide.*		
B	13E *within Denali State Park*	**One bear** *every regulatory year*		Aug 10-June 15
B	13 *remainder*	**One bear** *every regulatory year*		no closed season
Bison				
B	13D	**One bison** *by permit every ten regulatory years*	DI454	Sept 1-Mar 31
Caribou		*• In bag limit, "caribou" means an animal of either sex.* *• Nelchina Herd information is available by calling 907-267-2304.* *• Proxy hunting restrictions apply, see page 12.* *• Meat taken prior to Oct 1 in Unit 13 must remain on the bones of the front quarters, hindquarters, and ribs until removed from the field or processed for human consumption.*		
R	13	**One caribou** *by permit. Permits are only available by application. Application period is November to December. See Tier I/II Supplement for details.*	RC566	Aug 10-Sept 20 Oct 21-Mar 31
R	13	OR **One caribou** *by permit*	CC001	Aug 10-Sept 20 Oct 21-Mar 31
R	13	**One bull** *by permit*	DC480-DC483	Aug 20-Sept 20 Oct 21-Mar 31
N	13			no open season

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Source: ADFG 2011c.

OPEN TO:	R = RESIDENTS ONLY	B = RESIDENTS AND NONRESIDENTS	N = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS		PERMIT/ HUNT #*	OPEN SEASON
Goat		• *Taking of nannies with kids is prohibited. Taking of males is encouraged.* • *Information on sex identification available with permits.* • *Nonresident hunters must be accompanied by a guide (see page 10).*			
B	13D	*south of the Tiekel River and east of a line beginning at the confluence of the Tiekel and Tsina rivers*	**One goat** *by permit available in person in Anchorage, Fairbanks, Palmer, or Glennallen, or by mail from Glennallen beginning Aug 10*	RG580	Sept 1-Nov 30
B	13D	*remainder*	**One goat** *by permit*	DG720	Aug 10-Sept 20
B	13	*remainder*			no open season
Moose		• *In bag limit, "moose" means an animal of either sex; "bull" means a male moose.* • *Spike-fork, 50-inch antlers, and brow tines are defined on pages 33-34.* • *In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.* • *Proxy hunting restrictions apply, see page 12.* • *Meat must remain on the bones of the front quarters, hindquarters, and ribs until removed from the field or processed for human consumption.*			
R	13	**One bull** *by permit*	OR	CM300	Aug 10-Sept 20
R	13	**One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*		HT	Sept 1-Sept 20
R	13	**One bull** *by permit*		DM330-DM334	Sept 1-Sept 20
N	13	**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*		DM335-DM339	Sept 1-Sept 20
Sheep		• *Nonresident hunters must be accompanied by a guide, see page 10.* • *See definition of full-curl horn and drawings on page 31.* • *Ram horns must be sealed within 30 days of kill and horns must accompany meat from the field.*			
B	13A	**One ram** *with full-curl horn or larger*		HT	Aug 10-Sept 20
B	13B	within Delta Controlled Use Area	**One ram** *with full-curl horn or larger by permit*	DS203/ DS204	Aug 10-Sept 20
B	13B	*remainder*	**One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
B	13C	*within Tok Management Area*	**One ram** *with full-curl horn or larger every four regulatory years by permit*	DS102	Aug 10-Aug 25
B	13C	*within Tok Management Area*	**One ram** *with full-curl horn or larger every four regulatory years by permit*	DS103	Aug 26-Sept 20
B	13C	*remainder*	**One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
B	13D	*east of a line along the west side of Tazlina Glacier, Tazlina Lake and Mendeltna Creek to the Richardson highway*	**One ram** *with full-curl horn or larger by permit*	DS165/ DS265	Aug 10-Sept 20
B	13D	*west of a line along the west side of Tazlina Glacier, Tazlina Lake and Mendeltna Creek*	**One ram** *by permit*	DS160/ DS260	Aug 10-Sept 20
B	13D	*remainder*	**One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
B	13E	**One ram** *with full-curl horn or larger*		HT	Aug 10-Sept 20
Wolf		***A portion of this unit is within a predator control area and special regulations apply. See predator control supplement.*** • *Hides must be sealed within 30 days of kill.* ***Supplement available online at http://hunt.alaska.gov*** • *No nonresident tag required.*			
B	13	**Ten wolves** *per day*			Aug 10-Apr 30
Wolverine		• *Hides must be sealed within 30 days of kill.*			
B	13	**One wolverine**			Sept 1-Jan 31

**Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.*

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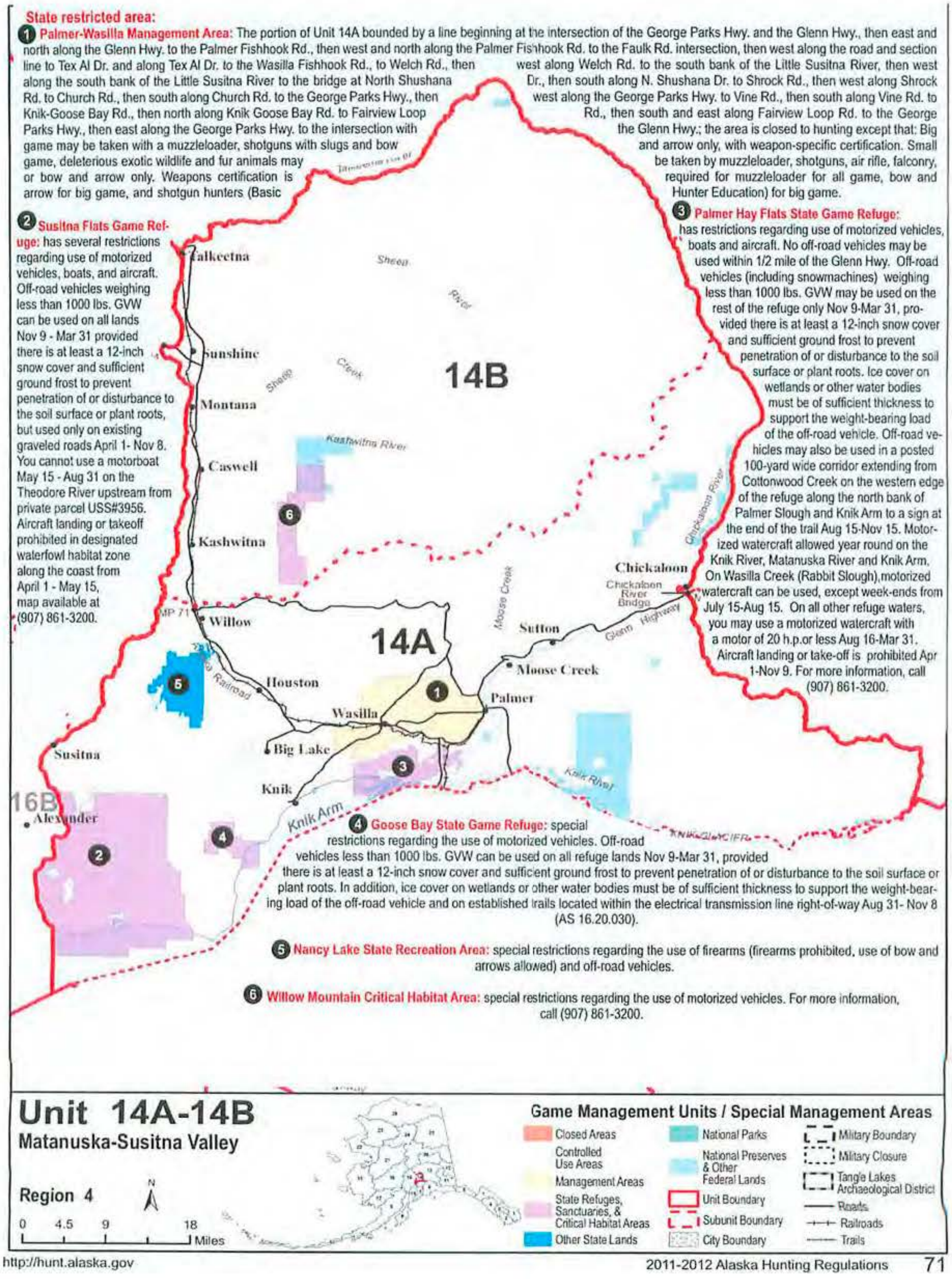
Source: ADFG 2011c.



Source: ADFG 2011c.

Units 14A -14B Matanuska-Susitna Valley

Unit 14: drainages into the north side of Turnagain Arm west of and excluding the Portage Creek drainage, drainages into Knik Arm excluding drainages of the Chickaloon and Matanuska Rivers in Unit 13, drainages into the north side of Cook Inlet east of the Susitna River, drainages into the east bank of the Susitna River downstream from the Talkeetna River, and drainages into the south and west bank of the Talkeetna River to its confluence with Clear Creek, the westside drainages of a line going up the south bank of Clear Creek to the first unnamed creek on the south, then up that unnamed creek to lake 4408, along the northeast shore of lake 4408, then southeast in a straight line to the northernmost fork of the Chickaloon River, and all seaward waters and lands within three (3) miles of these coastlines;
Unit 14A: drainages in Unit 14 bounded on the west beginning at the Matanuska-Susitna Borough boundary along longitude line 150°30'00" to the mouth of the Susitna River, then north along the east bank of the Susitna River, on the north by the north bank of Willow Creek and Peters Creek to its headwaters, then east along the hydrologic divide separating the Susitna River and Knik Arm drainages to the outlet creek at lake 4408, on the east by the eastern boundary of Unit 14, and on the south by Cook Inlet, Knik Arm, and the Matanuska-Susitna Borough boundary to the Glenn Highway bridge, then to the south bank of Knik Arm, then to the south bank of the Knik River from its mouth to its junction with Knik Glacier, across the face of Knik Glacier and along the north side of Knik Glacier to the Unit 6 boundary;
Unit 14B: that portion of Unit 14 north of Unit 14A;

See map page 71 for state restricted areas in Units 14A &14B.

OPEN TO: **R** = RESIDENTS ONLY | **B** = RESIDENTS AND NONRESIDENTS | **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear		*• See pages 25-27 for bear information and salvage requirements. • Evidence of sex must remain naturally attached to hide.*		
B	14A, 14B	**Three bears** ***NEW!***	HT	no closed season
Brown/Grizzly Bear		*• Nonresident hunters must be accompanied by a guide, see page 10. • See pages 25-27 for additional bear hunting information. • Evidence of sex must remain naturally attached to the hide.*		
B	14A	**One bear** *every four regulatory years*		Sept 1-May 31
B	14B	**One bear** *every regulatory year*		Aug 10-May 31
Caribou		*• In bag limit, "caribou" means an animal of either sex.*		
B	14A			no open season
B	14B	**One caribou** *by permit*	DC590	Aug 10-Sept 20
Goat		*• Taking of nannies with kids is prohibited. Taking of males is encouraged. • Information on sex identification available with permits. • Nonresident hunters must be accompanied by a guide, see page 10.*		
B	14A	*south and east of the Matanuska River* — **One goat** *by permit*	DG866	Sept 1-Oct 31
B	14A	*south and east of the Matanuska River* — **One goat** *by permit available online or in person in Palmer or Anchorage beginning Oct 1*	RG866	Oct 10-Oct 31
B	14A 14B	*remainder*		no open season
Moose		*• Spike-fork, 50-inch antlers, and brow tines are defined on pages 33-34. • In bag limit, "moose" means an animal of either sex; "bull" means a male moose. • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
R	14A	**One antlerless moose** *by permit*	DM400-DM412	Aug 25-Sept 25
		OR		
R	14A	**One moose** *by permit* ***by shotgun only****. Applications available in Palmer Oct 1-31 only. Hunter Education required* ***This is a "hot-spot hunt"!*** **NEW!**	RM415	may be announced
B	14A	**One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side* ***by bow and arrow only***	HT	Aug 10-Aug 17
		OR		
B	14A	**One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Aug 25-Sept 25
B	14B	**One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side* ***by bow and arrow only***	HT	Aug 10-Aug 17
		OR		
B	14B	**One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Aug 25-Sept 25

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Source: ADFG 2011c.

OPEN TO:	B = RESIDENTS ONLY	B = RESIDENTS AND NONRESIDENTS		N = NONRESIDENTS ONLY
OPEN TO:	**UNIT/ AREA**	**BAG LIMIT AND SPECIAL INSTRUCTIONS**	**PERMIT/ HUNT #***	**OPEN SEASON**
Sheep		*• Nonresident hunters must be accompanied by a guide, see page 10. • Full-curl horn definition and drawings can be found on page 31. • Ram horns must be sealed within 30 days of kill and horns must accompany meat from the field.*		
B	14A	*south and east of the Matanuska River* — **One ram** *by permit*	DS170-195/ DS270-295	Aug 10-Sept 20
B	14A 14B	*remainder* — **One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
Wolf		*• Hides must be sealed within 30 days of kill.*		
B	14A, 14B	**Five wolves**		Aug 10-Apr 30
Wolverine		*• Hides must be sealed within 30 days of kill.*		
B	14A, 14B	**One wolverine**		Sept 1-Jan 31

*Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.


Ryan Rhodes, age 4, and his sister Haley, age 6, enjoyed hunting for snowshoe hares at Point MacKenzie.


Garrett Rhodes shot his three grouse with his .410 on a hunt with his dad, Gerrett.

http://hunt.alaska.gov

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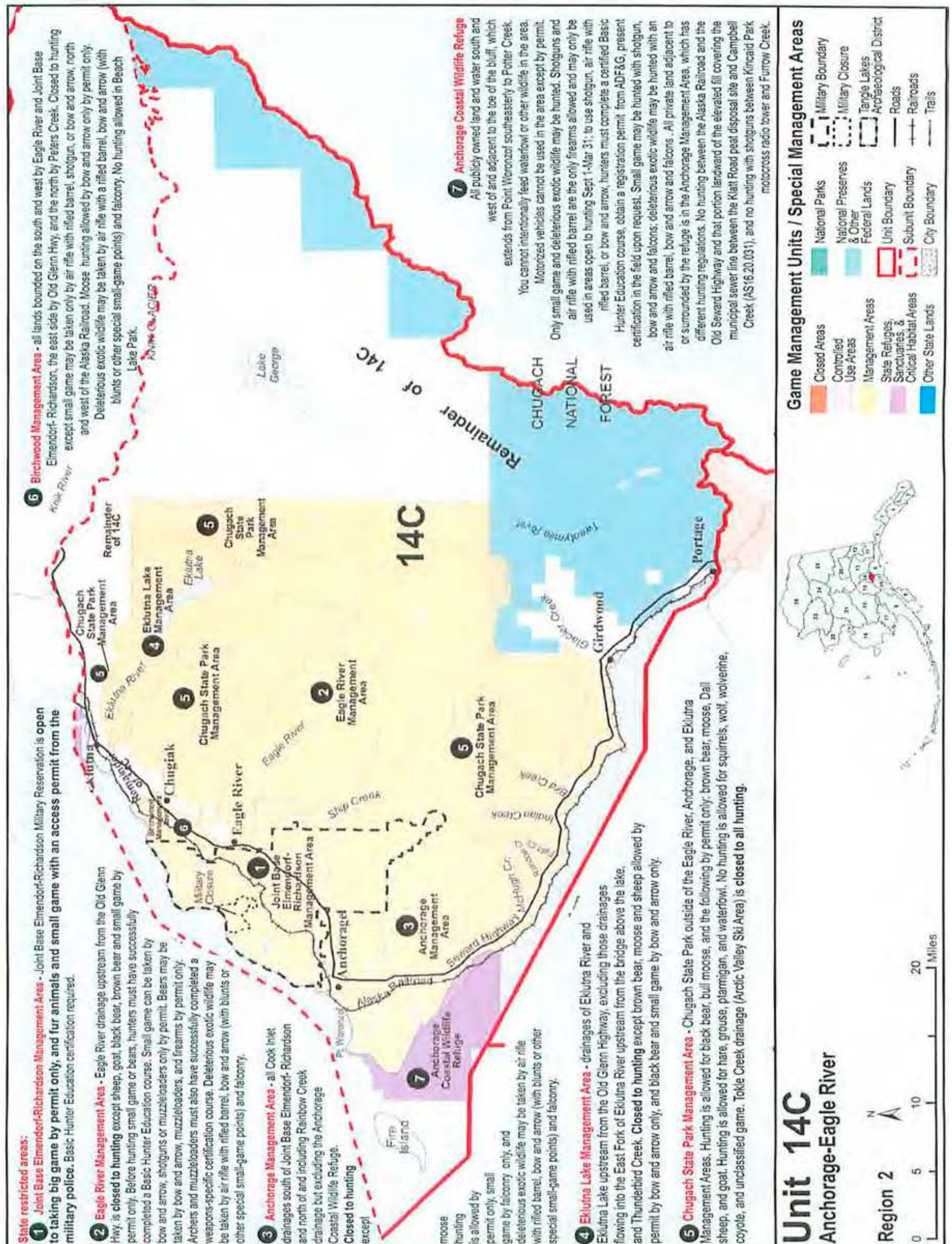
Source: ADFG 2011c.



Source: ADFG 2011c.

Unit 14C Anchorage and Eagle River

Unit 14C: that portion of Unit 14 south of Unit 14A.

See map page 74 for state restricted areas in Unit 14C.

OPEN TO: **R** = RESIDENTS ONLY | **B** = RESIDENTS AND NONRESIDENTS | **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA		BAG LIMIT AND SPECIAL INSTRUCTIONS		PERMIT/ HUNT #*	OPEN SEASON
Black Bear			• See pages 25-27 for additional bear hunting information and salvage requirements. • Evidence of sex must remain naturally attached to the hide. • Harvest ticket required.			
B	14C	Lower Eagle River Valley	**One bear** ***by bow and arrow or muzzleloader only*** by permit available online at http://hunt.alaska.gov or in person in Anchorage and Palmer beginning Aug 17	Basic Hunter Ed and Weapons Certification Required	RL450	Sept 6-May 31
B	14C	Upper Eagle River Valley	**One bear** by permit available online at http://hunt.alaska.gov or in person in Anchorage and Palmer beginning Aug 17	Basic Hunter Ed Required	RL460	Sept 6-June 15
B	14C	remainder of Eagle River, Joint Base Elmendorf-Richardson, Anchorage, Birchwood Management Areas				no open season
B	14C	Eklutna Lake Management Area	**One bear** ***by bow and arrow only***		HT	Sept 6-May 31
B	14C	Chugach State Park Management Area	**One bear**		HT	Sept 6-May 31
B	14C	remainder	**One bear**		HT	no closed season
Brown/Grizzly Bear			• Nonresident hunters must be accompanied by a guide, see page 10. • See pages 25-27 for additional bear hunting information. • Evidence of sex must remain naturally attached to the hide.			
B	14C	Joint Base Elmendorf-Richardson, Anchorage and Birchwood Mgmt. Areas, remainder of Eklutna Lake and Eagle River Management Areas				no open season
B	14C	Eklutna Lake Management Area within Chugach State Park	**One bear** every regulatory year ***by bow and arrow only*** by permit		DB468	Sept 6-May 31
B	14C	Chugach State Park Mgmt. Area and that portion of Eagle River Management Area above Icicle Creek	**One bear** every regulatory year by permit		DB470	Sept 6-May 31
B	14C	remainder	**One bear** every four regulatory years			Sept 1-May 31
Goat			• Taking of nannies with kids is prohibited. Taking of males is encouraged. • Information on sex identification available with permits. • Nonresident hunters must be accompanied by a guide, see page 10.			
B	14C	east fork of Eklutna River, Eagle River, Bird Creek, Glacier Creek	**One goat** by permit		DG852-DG858	Sept 6-Oct 15
B	14C	Twentymile River/Lake George	**One goat** ***by bow and arrow only*** by permit available online at http://hunt.alaska.gov or in person in Anchorage, Palmer, and Soldotna beginning Aug 3		RG878-RG879	Aug 16-Aug 31
			OR			
R	14C	Twentymile River/Lake George	**One goat** by permit available online at http://hunt.alaska.gov or in person in Anchorage, Palmer, and Soldotna beginning Aug 17		RG868-RG869	Sept 1-Oct 15
R	14C	Twentymile River/Lake George	**One goat** by permit available online at http://hunt.alaska.gov or in person in Anchorage, Palmer and Soldotna (season may be announced Nov 1-Nov 15)		RG862 /RG864	may be announced
N	14C	Twentymile River/Lake George	**One goat** by permit		DG868-DG869	Sept 1-Oct 15
B	14C	remainder (excluding all areas listed above)				no open season

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Source: ADFG 2011c.

OPEN TO:	R = RESIDENTS ONLY	B = RESIDENTS AND NONRESIDENTS		N = NONRESIDENTS ONLY	
OPEN TO:	**UNIT/ AREA**	**BAG LIMIT AND SPECIAL INSTRUCTIONS**		**PERMIT/ HUNT #***	**OPEN SEASON**
Moose		*• In bag limit, "moose" means an animal of either sex; "bull" means a male moose. • Spike-fork, 50-inch antlers, and brow tines are defined on pages 33-34. • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*			
B	14C	*Birchwood Management Area*	**One bull** ***by bow and arrow only*** *by permit*	DM448	Sept 6-Sept 30
B	14C	*Joint Base Elmendorf-Richardson Management Area*	**One moose** ***by muzzleloader only*** *by permit*	DM421-DM423	Sept 6-Jan 15
			OR		
B	14C	*Joint Base Elmendorf-Richardson Management Area*	**One moose** ***by bow and arrow only*** *by permit*	DM424, DM426-428/430	Sept 6-Jan 15
B	14C	*Chugach State Park Management Area (excluding Ship Creek drainage)*	**One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Sept 6-Sept 30
B	14C	*Ship Creek drainage above Joint Base Elmendorf-Richardson Management Area*	**One bull** *by permit*	DM446-DM447	Sept 6-Sept 30
			OR		
B	14C	*Ship Creek drainage above Joint Base Elmendorf-Richardson Management Area*	**One bull** *by permit in person in Anchorage beginning Oct. 5. Number of permits to be announced.*	RM435	Oct 25-Nov 30
R	14C	*Anchorage Management Area*	**One antlerless moose** ***by shotgun or muzzleloader only*** *by permit*	DM666	Nov 1-Nov 30
B	14C	*Eagle River Management Area*			no open season
B	14C	*Eklutna Lake Management Area*	**One bull** ***by bow and arrow only*** *by permit online at http://hunt.alaska.gov or in person available in Anchorage, Palmer, and Soldotna beginning Aug 17*	RM445	Sept 6-Oct 20
B	14C	*Twentymile River drainage*	**One bull** *by permit*	DM210	Aug 20-Sept 30
			OR		
R	14C	*Twentymile River drainage*	**One antlerless moose** *by permit*	DM211	Aug 20-Oct 10
B	14C	*remainder (excluding all areas listed above)*	**One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Sept 6-Sept 30
			OR		
R	14C	*remainder (excluding all areas listed above)*	**One antlerless moose** *by permit*	DM441/ DM443	Sept 6-Sept 30
Sheep		*• Nonresident hunters must be accompanied by a guide, see page 10. • See definition of full-curl horn and drawings on page 31. • Ram horns must be sealed within 30 days of kill and must accompany meat from the field.*			
B	14C		**One ram** *with full-curl horn or larger by permit*	DS123–139/ 224/ 227/230-233/236-239	Aug 10-Sept 30
			OR		
B	14C		**One sheep** ***by bow and arrow*** *only by permit*	DS140-141/ 240/ 241	Sept 6-Oct 10
Wolf		*• Hides must be sealed within 30 days of kill.*			
B	14C	*remainder (outside of special management areas)*	**Five wolves**		Aug 10-Apr 30
Wolverine		*• Hides must be sealed within 30 days of kill.*			
B	14C	*remainder (outside of special management areas)*	**One wolverine**		Sept 1-Jan 31

*Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.

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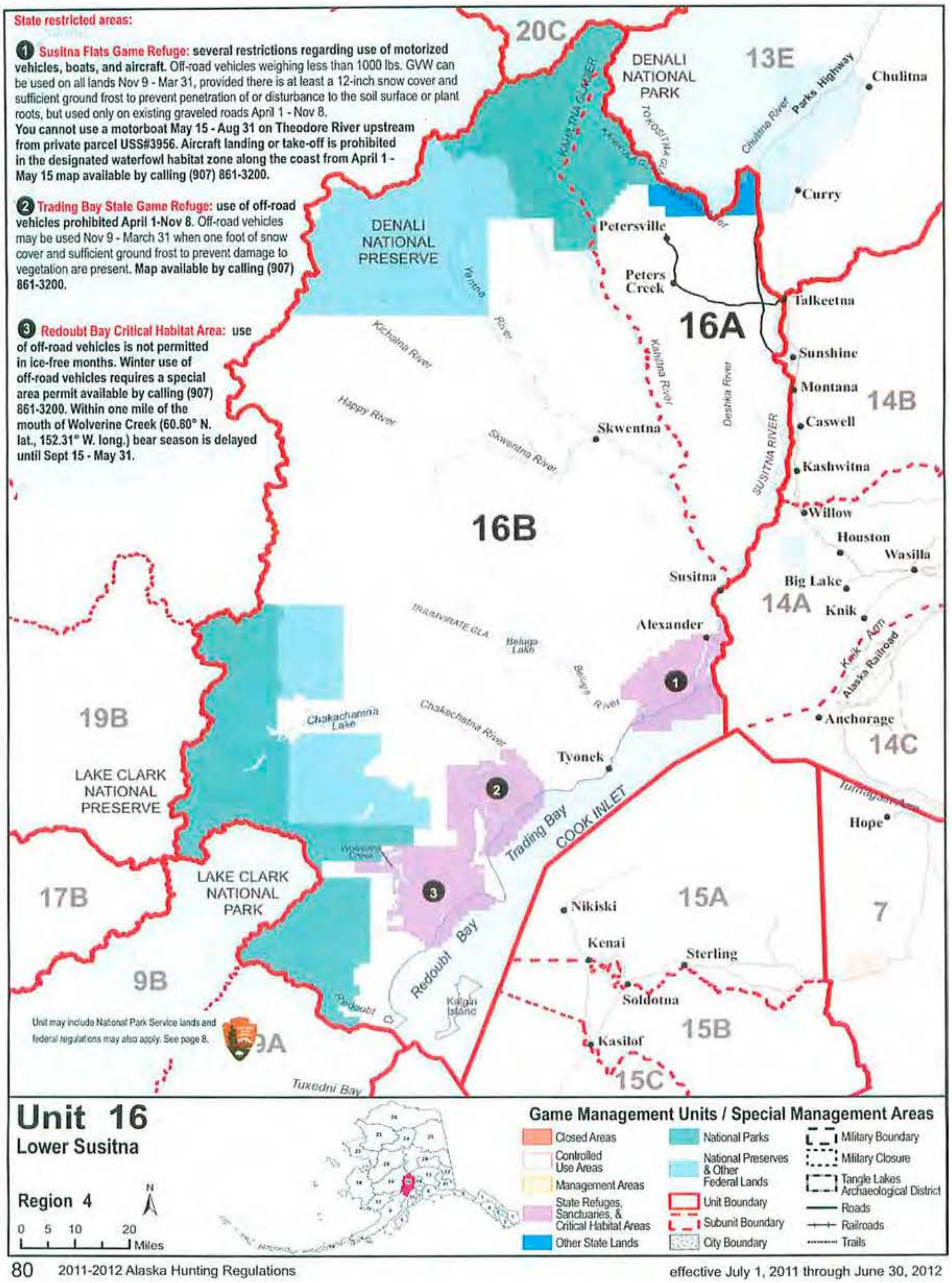
Source: ADFG 2011c.



Source: ADFG 2011c.

Unit 16 Lower Susitna

See map on page 80 for state restricted areas in Unit 6.

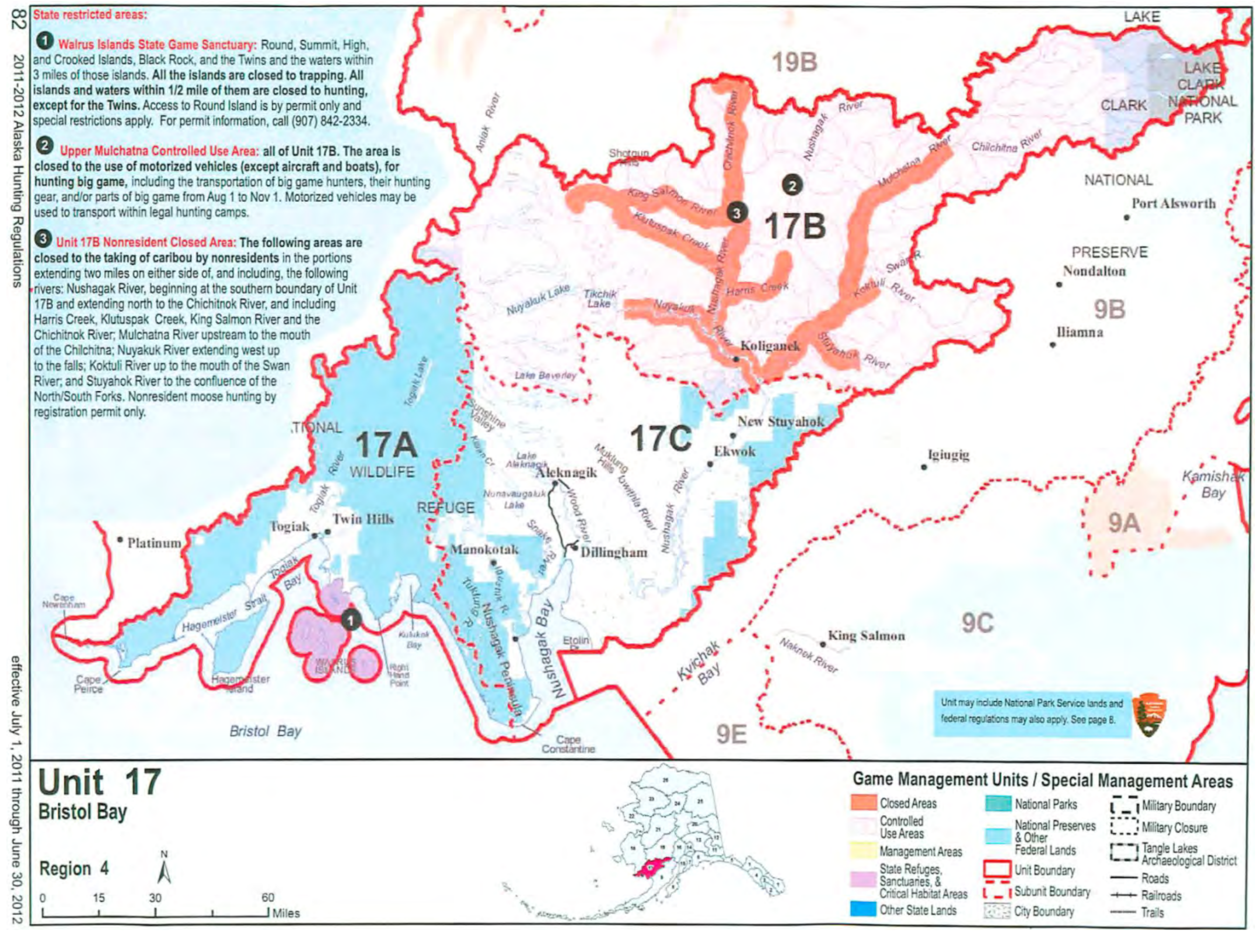
Unit 16: The drainages into Cook Inlet between Redoubt Creek and the Susitna River, including Redoubt Creek drainage, Kalgin Island, and the drainages on the west side of the Susitna River (including the Susitna River) upstream to its junction with the Chulitna River; the drainages into the west side of the Chulitna River (including the Chulitna River) upstream to the Tokositna River (including the Tokositna River) and drainages into the south side of the Tokositna River upstream to the base of the Tokositna Glacier, including the drainage of the Kanikula Glacier and all seaward waters and lands within three (3) miles of these coastlines.
Unit 16A: that portion of Unit 16 east of the east bank of the Yentna River from its mouth upstream to the Kahiltna River, east of the east bank of the Kahiltna River, and east of the Kahiltna Glacier;
Unit 16B: the remainder of Unit 16;

OPEN TO: **R** = RESIDENTS ONLY **B** = RESIDENTS AND NONRESIDENTS **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear		*• See pages 25-27 for bear information and salvage requirements. • Evidence of sex must remain naturally attached to hide.*		
B	16B	within one mile of the mouth of Wolverine Creek (60.80 N. lat., 152.31 W. long.) — Three bears	HT	Sept 15-May 31
B	16	remainder — Three bears	HT	no closed season
Brown/Grizzly Bear		*• No resident tag required in Unit 16, except 16A in Denali State Park. • Nonresident hunters must be accompanied by a guide, see page 10. • Special restrictions apply in Redoubt Bay Critical Habitat Area. • See pages 25-27 for additional bear hunting information. • Evidence of sex must remain naturally attached to the hide.*		
B	16A	One bear *every regulatory year*		no closed season
B	16B	within one mile of the mouth of Wolverine Creek (60.80 N. lat., 152.31 W. long.) — Two bears *every regulatory year*		Sept 15-May 31
B	16B	remainder — Two bears *every regulatory year*		no closed season
Caribou		*• In bag limit "caribou" means an animal of either sex; "bull" means male caribou • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
B	16A	One bull	HT	Aug 10-Sept 20
B	16B	One bull	HT	Aug 10-Sept 30
Moose		*• In bag limit, "moose" means an animal of either sex; "bull" means a male moose • Spike-fork, 50-inch antlers, and brow tines are defined on pages 33-34. • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
B	16A	One bull *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side,* ***by bow and arrow only***	HT	Aug 10-Aug 17
		OR		
B	16A	One bull *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Aug 20-Sept 25
B	16B	Kalgin Island — One moose *by permit available in person in Anchorage, Soldotna, Homer and Palmer beginning Aug 3*	RM572	Aug 20-Sept 20
R	16B	remainder — One bull *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Aug 20-Sept 25
		OR		
R	16B	remainder — One bull *by permit*	TM565/ 567/569	Nov 15-Feb 28
N	16B	remainder — One bull *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side* NEW!	HT	Aug 25-Sept 15
Sheep		*• Nonresident hunters must be accompanied by a guide, see page 10. • See definition of full-curl horn and drawings on page 31. • Ram horns must be sealed within 30 days of kill and must accompany meat from the field.*		
B	16	One ram *with full-curl horn or larger*	HT	Aug 10-Sept 20
Wolf		*A portion of this unit is within a predator control area and special regulations apply. See predator control supplement. Supplement available online at http://hunt.alaska.gov • Hides must be sealed within 30 days of kill. • No nonresident tag required.*		
B	16A	Ten wolves per season, no more than five per day		Aug 10-Apr 30
B	16B	Ten wolves		Aug 10-Apr 30
Wolverine		*• Hides must be sealed within 30 days of kill.*		
B	16A	One wolverine		Sept 1-Jan 31
B	16B	One wolverine		Sept 1-Mar 31

http://hunt.alaska.gov *Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15. 2011-2012 Alaska Hunting Regulations 81

Source: ADFG 2011c.



Source: ADFG 2011c.

Unit 17 Bristol Bay

See map on page 82 for state restricted areas in Unit 17.

Unit 17: drainages into Bristol Bay and the Bering Sea between Etolin Point and Cape Newenham and all islands between these points, including Hagemeister Island and the Walrus Islands and all seaward waters and lands within three (3) miles of these coastlines.
Unit 17A: the drainages between Cape Newenham and Cape Constantine, and Hagemeister Island and the Walrus Islands
Unit 17B: the Nushagak River drainage upstream from and including the Mulchatna River drainage and the Wood River drainage upstream from the outlet of Lake Beverley
Unit 17C: the remainder of Unit 17

OPEN TO: **R** = RESIDENTS ONLY **B** = RESIDENTS AND NONRESIDENTS **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear		*• See pages 25-27 for bear information and salvage requirements. • Evidence of sex must remain naturally attached to hide.*		
R	17	**Two bears**		Aug 1-May 31
N	17	**One bear**		Aug 1-May 31
Brown/Grizzly Bear		*• No resident tag required. • See pages 25-27 for additional bear hunting information. • Nonresident hunters must be accompanied by a guide, see page 10. • Evidence of sex must remain naturally attached to the hide.*		
B	17	**Two bears** *every regulatory year* **NEW!**		Aug 20-May 31
In addition to other regulations, subsistence regulations apply to the following "Residents Only" hunt (see page 26)				
R	17	**Two bears** *every regulatory year by permit available in Dillingham beginning July 1*	RB500	Aug 20-May 31
Caribou		*• Proxy hunting restrictions apply, see page 12. • In areas indicated by a ✪, federal restrictions apply, see page 8. • In bag limit "caribou" means an animal of either sex; "bull" means male caribou. • Meat taken in Unit 17 prior to Oct 1 must remain on the bones of the front quarters and hindquarters until removed from the field or processed for human consumption. • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
R	17A	*all drainages east of Right Hand Point* ✪ — **One caribou**	HT	may be announced
R	17A	*remainder* — **Two caribou** - *no more than one bull may be taken, and no more than one caribou may be taken from Aug 1-Jan 31*	HT	Aug 1-Mar 15
R	17B	*Nonresident Closed Area* — **Two caribou** - *no more than one bull may be taken, and no more than one caribou may be taken from Aug 1-Jan 31*	HT	Aug 1-Mar 15
R	17B 17C	*remainder AND east of Wood River and Wood River Lakes* — **Two caribou** - *no more than one bull may be taken, and no more than one caribou may be taken from Aug 1-Jan 31*	HT	Aug 1-Mar 15
N	17B 17C	*remainder AND east of Wood River and Wood River Lakes*		no open season
R	17C	*remainder* ✪ — **One caribou**	HT	may be announced
Moose		*• In bag limit, "moose" means an animal of either sex; "bull" means a male moose; • Spike-fork, 50-inch antlers, and brow tines are defined on pages 33-34. • Meat taken in Unit 17 prior to Oct 1 must remain on the bones of the front quarters and hindquarters until removed from the field or processed for human consumption. • In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		
R	17A	**One bull** *by permit available in person in Dillingham and Togiak beginning Aug 15*	RM573	Aug 25-Sept 20
		OR		
R	17A	**One antlered bull** *by permit available in person in Dillingham and Togiak, (up to a 14-day season may be announced Dec 1- Jan 31)*	RM575	may be announced
N	17A			no open season

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http://hunt.alaska.gov 2011-2012 Alaska Hunting Regulations 83

Source: ADFG 2011c.

OPEN TO: R = RESIDENTS ONLY B = RESIDENTS AND NONRESIDENTS N = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA		BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Moose *continued*					
R	17B	Nonresident Closed Area	**One bull** *by permit available in person in Dillingham July 15-Aug 31 and Nushagak River villages*	RM583	Aug 20-Sept 15
R			OR **One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Sept 1-Sept 15
R			**One antlered bull** *by permit available in person in Dillingham beginning Oct 25 and Nushagak River villages*	RM585	Dec 1-Dec 31
N			**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side by permit available in person in Dillingham July 15-Sept 8* — **Nonresident orientation required****	RM587	Sept 5-Sept 15
R	17B	remainder	**One bull** *by permit available in person in Dillingham July 15-Aug 31 and Nushagak River villages*	RM583	Aug 20-Sept 15
R			OR **One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Sept 1-Sept 15
R			**One antlered bull** *by permit available in person in Dillingham beginning Oct 25 and Nushagak River villages*	RM585	Dec 1-Dec 31
N			**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side* — **Nonresident orientation required****	HT	Sept 5-Sept 15
R	17C		**One bull** *by permit available in person in Dillingham July 15-Aug 31 and Nushagak River villages*	RM583	Aug 20-Sept 15
R			OR **One bull** *with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on at least one side*	HT	Sept 1-Sept 15
R			**One antlered bull** *by permit available in person in Dillingham beginning Oct 25 and Nushagak River villages*	RM585	Dec 1-Dec 31
N					no open season
Wolf			*• Hides must be sealed within 30 days of kill.*		
B	17		**Ten wolves** *per day*		Aug 10-Apr 30
Wolverine			*• Hides must be sealed within 30 days of kill.*		
B	17		**One wolverine**		Sept 1-Mar 31

*Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.

****Orientation Requirement for NONRESIDENT Moose Hunters in Unit 17B**

A nonresident hunter must attend an ADF&G-approved hunter orientation course or must be accompanied in the field by a registered guide or resident family member within the second-degree of kindred. For further info, contact ADF&G at 907-267-2257.

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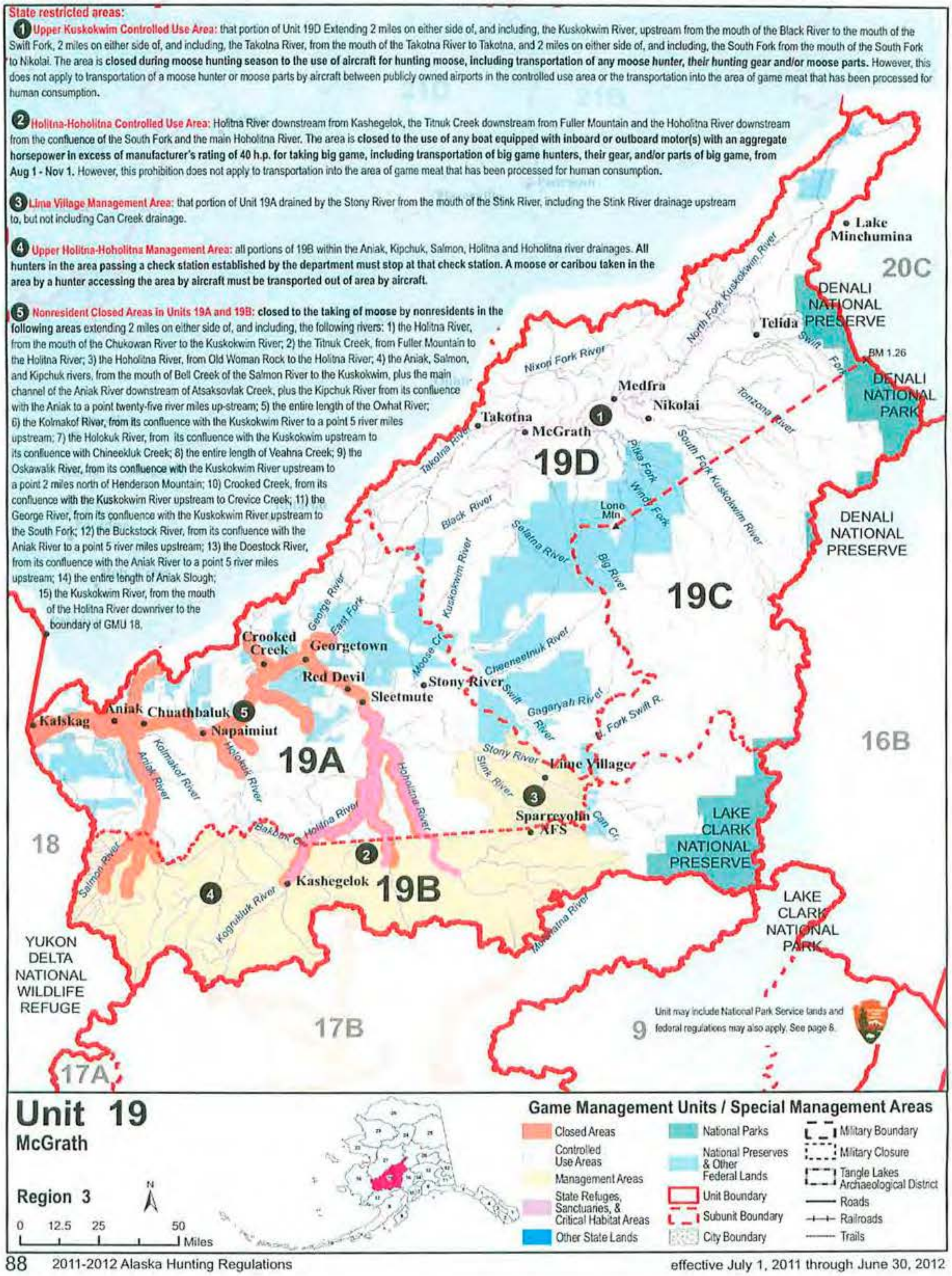
Source: ADFG 2011c.



Source: ADFG 2011c.

Unit 19 McGrath

See map on page 88 for state restricted areas in Unit 19.

Unit 19: All drainages into the Kuskokwim River upstream from a straight line drawn between Lower Kalskag and Paimiut.
Unit 19A: That area drained by the Kuskokwim River downstream from and including the Moose Creek drainage on the north bank and downstream from and including the Stony River drainage, excluding that portion listed in Unit 19B.
Unit 19B: Unit 19 drained by the Aniak River upstream from and including the Salmon River; that area drained by the Holitna River upstream from and including Bakbuk Creek; that area south of a line running directly between the mouth of Bakbuk Creek on the Holitna River and the radar dome at Sparrevohn Air Force Base including that area drained by the Hoholitna River upstream from that line; and the drainage of the Stony River upstream from and including the drainage of Can Creek.
Unit 19C: Unit 19 south and east of a line from Benchmark M1.26 (approximately 1.26 miles south of the northwest corner of the original Mt. McKinley National Park Boundary) to Lone Mountain, and thence due west to Big River; the drainage of Big River upstream from the intersection of this line; and the drainage of Swift River upstream from and including the drainage of the North Fork.
Unit 19D: The remainder of Unit 19.

OPEN TO: **R** = RESIDENTS ONLY | **B** = RESIDENTS AND NONRESIDENTS | **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Black Bear		*• See pages 25-27 for bear information and salvage requirements.* *• Harvest tickets are required in Unit 19D.*		
B	19A	**Five bears**		no closed season
B	19D	**Five bears**	HT	no closed season
B	19B, 19C	**Three bears**		no closed season
Brown/Grizzly Bear		*• No resident tag required.* *• Nonresident hunters must be accompanied by a guide, see page 10.* *• See pages 25-27 for additional bear hunting information.* *• Evidence of sex must remain naturally attached to the hide.*		
B	19A, 19D	**Two bears** *every regulatory year*		Aug 10-June 30
B	19B, 19C	**One bear** *every regulatory year*		Sept 1-May 31
In addition to other regulations, subsistence regulations apply to the following "Residents Only" hunts (see page 26)				
R	19A	*downstream of and including the Aniak River drainage* — **Two bears** *every regulatory year by permit available in Galena, Fairbanks, and McGrath beginning July 1*	RB601	Aug 10-June 30
R	19B	*downstream of and including the Aniak River drainage* — **One bear** *every regulatory year by permit available in Galena, Fairbanks, and McGrath beginning July 1*	RB601	Aug 10-June 30
Bison				
B	19	**One bison** *every ten regulatory years by permit*	DI351	Sept 1-Sept 30
		OR		
B	19	**One bison** *every ten regulatory years by permit*	DI352	Mar 1-Mar 31
Caribou		*• Proxy hunting restrictions apply, see page 12.* *• In bag limit "caribou" means an animal of either sex; "bull" means male caribou.* *• In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.* *• Meat taken prior to Oct 1 in Unit 19A within the Holitna-Hoholitna Controlled Use Area, and Unit 19B, must remain on the bones of the front quarters and hindquarters until removed from the field or processed for human consumption.*		
R	19A 19B	**Two caribou** - *not more than one bull may be taken, and only one caribou can be taken between Aug 1-Jan 31*	HT	Aug 1-Mar 15
N	19A 19B			no open season
B	19C	**One bull**		HT	Aug 10-Sept 20
B	19D	*drainages of the Nixon Fork River* — **One bull**	HT	Aug 10-Sept 20
R	19D	*remainder* — **One bull**	HT	Aug 10-Sept 20
		OR		
R	19D	*remainder* — **One caribou**	HT	Nov 1-Jan 31
N	19D	*remainder* — **One bull**	HT	Aug 10-Sept 20
Moose		*• In areas indicated by a federal restrictions exist, see page 8.* *• In bag limit, "moose" means an animal of either sex; "bull" means a male moose.* *• 50-inch antlers and brow tines are defined on pages 33-34.* *• Meat taken prior to Oct 1 in Unit 19A within the Holitna-Hoholitna Controlled Use Area, and Unit 19B must remain on the bones of the front quarters and hindquarters until removed from the field or processed for human consumption.* *• In all hunts limited to one sex, evidence of sex must remain naturally attached to the meat.*		

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http://hunt.alaska.gov 2011-2012 Alaska Hunting Regulations 89

Source: ADFG 2011c.

OPEN TO: **R** = RESIDENTS ONLY **B** = RESIDENTS AND NONRESIDENTS **N** = NONRESIDENTS ONLY

OPEN TO:	UNIT/ AREA	BAG LIMIT AND SPECIAL INSTRUCTIONS	PERMIT/ HUNT #*	OPEN SEASON
Moose *continued*				
R	19A	*Lime Village Management Area, that portion drained by the Stony River from the mouth of the Stink River, including the Stink River drainage upstream to, but not including the Can Creek drainage* — **Two bulls** *by permit*	TM684	Aug 10-Sept 25 Nov 20-Mar 31
R	19A	*Kuskokwim River drainage downstream from, and including, the George River drainage, and downstream from and excluding the Downey Creek drainage* — **One antlered bull** *by permit*	TM680	Sept 1-Sept 20
B	19A	*remainder*		no open season
R	19B	*within the Nonresident Closed Area* — **One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 1-Sept 20
R	19B	*remainder* — **One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 1-Sept 20
N	19B	*remainder* — **One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side. Nonresidents must attend an ADF&G-approved hunter orientation course or must be accompanied in the field by a registered guide or resident family member within the second-degree of kindred. Contact ADF&G 907-459-7206.*	HT	Sept 5-Sept 20
R	19C	**One bull** *with spike-fork or 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 1-Sept 20
R	19C	OR **One bull** *by permit available in person in McGrath and Nikolai beginning Jan 9* — Aircraft not allowed Jan 1 - Feb 28	RM655	Feb 1-Feb 28
N	19C	**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 1-Sept 20
R	19D	*Upper Kuskokwim Controlled Use Area* — **One antlered bull** *by permit available in person in McGrath, Nikolai and Takotna July 14-Aug 19*	RM650	Sept 1-Sept 25
R	19D	*Upper Kuskokwim Controlled Use Area* — OR **One moose** *by permit available in person in McGrath, Nikolai and Takotna*	RM651	may be announced
R	19D	*between and including Cheeneetnuk and Gagaryah river drainages, excluding that portion within 2 miles of the Swift River* — **One antlered bull**	HT	Sept 1-Sept 20
R	19D	OR **One antlered bull** *by permit available in person in McGrath, Nikolai and Takotna July 14-Aug 19*	RM650	Sept 1-Sept 25
R	19D	OR **One moose** *by permit available in person in McGrath, Nikolai and Takotna*	RM651	may be announced
N	19D	**One bull** *with 50-inch antlers or antlers with 4 or more brow tines on at least one side*	HT	Sept 1-Sept 20
R	19D	*remainder* — **One antlered bull**	HT	Sept 1-Sept 20
R	19D	*remainder* — OR **One antlered bull** *by permit available in person in McGrath, Nikolai and Takotna July 14-Aug 19*	RM650	Sept 1-Sept 25
R	19D	*remainder* — OR **One moose** *by permit available in person in McGrath, Nikolai and Takotna*	RM651	may be announced
Sheep		*• Nonresident hunters must be accompanied by a guide (see page 10).* *• See definition of full-curl horn and drawings on page 31. Horns must accompany meat from the field.* *• Ram horns must be sealed within 30 days of kill.*		
B	19	**One ram** *with full-curl horn or larger*	HT	Aug 10-Sept 20
Wolf		**A portion of this unit is within a predator control area and special regulations apply. See predator control supplement.** *• Hides must be sealed within 30 days of kill.* *Supplement available online at http://hunt.alaska.gov* *• No nonresident tag required.*		
B	19	**Ten wolves** *per day*		Aug 1-May 31
Wolverine		*• Hides must be sealed within 30 days of kill.*		
B	19	**One wolverine**		Sept 1-Mar 31

Hunt numbers starting with a "C" = Community, "D" = Drawing, "HT" = Harvest ticket, "R" = Registration, "T" = Tier II. See pages 14-15.

90 2011-2012 Alaska Hunting Regulations effective July 1, 2011 through June 30, 2012

Source: ADFG 2011c.

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Appendix J
Hazardous Materials

APPENDIX J
HAZARDOUS MATERIALS MUNITIONS USAGE

Event Record

Report Selection Criteria

Activities: **Range Training**

Areas: **R2211 Baseline + Proposed**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	R2211 Baseline + Proposed	MUN	1305004910429	A557	CTG CAL .50 3 BALL M2/1 TR M10	32,563	EA
RT	R2211 Baseline + Proposed	MUN	1305001437163	A131	CTG 7.62MM 4 BALL M80/1 TR M62	221,000	EA
RT	R2211 Baseline + Proposed	MUN	1305012687274	B118	CTG 30MM TP M788	31,363	EA
RT	R2211 Baseline + Proposed	MUN		E9aa	BOMB PRAC BDU-33, CXU-3A/B SIGNAL CTG	564	EA
RT	R2211 Baseline + Proposed	MUN	1340001436889	H490	RCKT HE 2.75IN W/WHD M151 & FUZE M423	293	EA
RT	R2211 Baseline + Proposed	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	18	EA

Event Record

Report Selection Criteria

Activities: **Range Training**

Areas: **BAX JCALF**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	BAX JCALF	MUN	1305001437049	A814	CTG 20MM 2 AP-T M95/2 INC M96	3,388	EA
RT	BAX JCALF	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	787	EA
RT	BAX JCALF	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	459	EA
RT	BAX JCALF	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	161	EA
RT	BAX JCALF	MUN	1315011656487	C784	CTG 120MM TP-T M831	1,149	EA
RT	BAX JCALF	MUN	1320005297331	D544	PROJ 155MM HE M107	117	EA
RT	BAX JCALF	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	240	EA
RT	BAX JCALF	MUN	1410013810715	PV30	GM SURF ATTACK AGM-114K (HELLFIRE)	18	EA
RT	BAX JCALF	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	3,186	EA

Event Record

Report Selection Criteria
Activities: **Range Training**
Areas: **R2202_DTA Baseline**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	R2202_DTA Baseline	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	125	EA
RT	R2202_DTA Baseline	MUN	1325007106768	E482	BOMB GP 500LB MK82 MOD1	38	EA
RT	R2202_DTA Baseline	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	243	EA
RT	R2202_DTA Baseline	MUN	1325001024261	E508	BOMB GP 1000LB MK83 MOD4	195	EA
RT	R2202_DTA Baseline	MUN		E9ar	BOMB PRAC BDU-45/B, CONICAL FIN, MK4 MOD3 SIGNAL CTG	64	EA
RT	R2202_DTA Baseline	MUN	1305001437049	A814	CTG 20MM 2 AP-T M95/2 INC M96	3,388	EA
RT	R2202_DTA Baseline	MUN	1305007661147	A769	CTG 20MM 1 HEI M97/1 INC M96/1 AP-T M95	9,788	EA
RT	R2202_DTA Baseline	MUN	1305013569838	A974	CTG 25MM APDS-T M791	4,788	EA
RT	R2202_DTA Baseline	MUN	1305011516767	B129	CTG 30MM HEDP M789	22,063	EA
RT	R2202_DTA Baseline	MUN	1325007106773	E464	BOMB GP 250LB MK81 MOD1	60	EA
RT	R2202_DTA Baseline	MUN		E9aa	BOMB PRAC BDU-33, CXU-3A/B SIGNAL CTG	334	EA
RT	R2202_DTA Baseline	MUN	1325012946384	F013	BOMB PRAC BDU-50A/B	150	EA
RT	R2202_DTA Baseline	MUN	1325013765088	E756	BOMB PRAC BDU-56/B INERT LOADED	113	EA
RT	R2202_DTA Baseline	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	163	EA
RT	R2202_DTA Baseline	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	77	EA
RT	R2202_DTA Baseline	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	76	EA
RT	R2202_DTA Baseline	MUN	1325001281066	E511	BOMB GP 1000LB MK83 MOD4 INERT LOADED	79	EA
RT	R2202_DTA Baseline	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	49	EA
RT	R2202_DTA Baseline	MUN	1325007106765	F127	BOMB GP 2000LB MK84 MOD2	65	EA
RT	R2202_DTA Baseline	MUN	1310001437021	B632	CTG 60MM HE M49A4	486	EA
RT	R2202_DTA Baseline	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	922	EA
RT	R2202_DTA Baseline	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	459	EA
RT	R2202_DTA Baseline	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	161	EA
RT	R2202_DTA Baseline	MUN	1315012929868	C787	CTG 120MM HEAT-MP-T M830	8	EA
RT	R2202_DTA Baseline	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	1,197	EA
RT	R2202_DTA Baseline	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	1,197	EA
RT	R2202_DTA Baseline	MUN	1320005297331	D544	PROJ 155MM HE M107	117	EA
RT	R2202_DTA Baseline	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	244	EA
RT	R2202_DTA Baseline	MUN		C995	CTG & LNCHR 84MM M136 AT-4 (surrogate)	50	EA
RT	R2202_DTA Baseline	MUN	1427001638959	PL23	GM & LAU SURF ATTACK M222 (DRAGON)	1	EA
RT	R2202_DTA Baseline	MUN	1410013810715	PV30	GM SURF ATTACK AGM-114K (HELLFIRE)	26	EA
RT	R2202_DTA Baseline	MUN	1340011490918	H108	RCKT POD 298MM PRAC M28 MLRS	2	EA
RT	R2202_DTA Baseline	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	3,688	EA
RT	R2202_DTA Baseline	MUN	1320005297331	D544	PROJ 155MM HE M107	9	EA
RT	R2202_DTA Baseline	MUN	1325007106773	E464	BOMB GP 250LB MK81 MOD1	200	EA
RT	R2202_DTA Baseline	MUN	1315005420179	C223	CTG 81MM HE M362 W/O FUZE	218	EA
RT	R2202_DTA Baseline	MUN	1315000284809	C445	CTG 105MM HE M1 W/O FUZE	2,635	EA
RT	R2202_DTA Baseline	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	779	EA
RT	R2202_DTA Baseline	MUN	1320005297348	D485	PROJ 155MM HE M101	1,615	EA
RT	R2202_DTA Baseline	MUN	1340001436889	H490	RCKT HE 2.75IN W/WHD M151 & FUZE M423	99	EA
RT	R2202_DTA Baseline	MUN	1376007809203		BLACK PWDR BULK (BLACK PWDR)	8	EA
RT	R2202_DTA Baseline	MUN			Aluminized propellant [C-4 1st stage]	2,515	LB

Event Record

Report Selection Criteria
Activities: **Range Training**
Areas: **R-2202/DTA RLOD**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	R-2202/DTA RLOD	MUN	1305001437049	A814	CTG 20MM 2 AP-T M95/2 INC M96	3,388	EA
RT	R-2202/DTA RLOD	MUN	1305007661147	A769	CTG 20MM 1 HEI M97/1 INC M96/1 AP-T M95	9,788	EA
RT	R-2202/DTA RLOD	MUN	1305013569838	A974	CTG 25MM APDS-T M791	4,788	EA
RT	R-2202/DTA RLOD	MUN	1305012689373	B129	CTG 30MM HEDP M789	22,063	EA
RT	R-2202/DTA RLOD	MUN	1325007106773	E464	BOMB GP 250LB MK81 MOD1	260	EA
RT	R-2202/DTA RLOD	MUN		E9aa	BOMB PRAC BDU-33, CXU-3A/B SIGNAL CTG	334	EA
RT	R-2202/DTA RLOD	MUN		E9ar	BOMB PRAC BDU-45/B, CONICAL FIN, MK4 MOD3 SIGNAL CTG	64	EA
RT	R-2202/DTA RLOD	MUN	1325012946384	F013	BOMB PRAC BDU-50A/B	150	EA
RT	R-2202/DTA RLOD	MUN	1325013765088	E756	BOMB PRAC BDU-56/B INERT LOADED	113	EA
RT	R-2202/DTA RLOD	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	212	EA
RT	R-2202/DTA RLOD	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	202	EA
RT	R-2202/DTA RLOD	MUN	1325007106768	E482	BOMB GP 500LB MK82 MOD1	357	EA
RT	R-2202/DTA RLOD	MUN	1325001281066	E511	BOMB GP 1000LB MK83 MOD4 INERT LOADED	77	EA
RT	R-2202/DTA RLOD	MUN	1325007106765	F127	BOMB GP 2000LB MK84 MOD2	65	EA
RT	R-2202/DTA RLOD	MUN	1325001024261	E508	BOMB GP 1000LB MK83 MOD4	325	EA
RT	R-2202/DTA RLOD	MUN	1310001437021	B632	CTG 60MM HE M49A4	486	EA
RT	R-2202/DTA RLOD	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	922	EA
RT	R-2202/DTA RLOD	MUN	1315005420179	C223	CTG 81MM HE M362 W/O FUZE	218	EA
RT	R-2202/DTA RLOD	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	459	EA
RT	R-2202/DTA RLOD	MUN	1315010127094	C445	CTG 105MM HE M1 W/O FUZE	2,635	EA
RT	R-2202/DTA RLOD	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	161	EA
RT	R-2202/DTA RLOD	MUN	1315012929868	C787	CTG 120MM HEAT-MP-T M830	8	EA
RT	R-2202/DTA RLOD	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	779	EA
RT	R-2202/DTA RLOD	MUN	1315011656487	C784	CTG 120MM TP-T M831	1,197	EA
RT	R-2202/DTA RLOD	MUN	1320005297348	D485	PROJ 155MM HE M101	1,615	EA
RT	R-2202/DTA RLOD	MUN	1320005297331	D544	PROJ 155MM HE M107	117	EA
RT	R-2202/DTA RLOD	MUN	1340001436889	H490	RCKT HE 2.75IN W/WHD M151 & FUZE M423	99	EA
RT	R-2202/DTA RLOD	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	244	EA
RT	R-2202/DTA RLOD	MUN		C995	CTG & LNCHR 84MM M136 AT-4 (surrogate)	50	EA
RT	R-2202/DTA RLOD	MUN	1427001638959	PL23	GM & LAU SURF ATTACK M222 (DRAGON)	1	EA
RT	R-2202/DTA RLOD	MUN	1410013810715	PV30	GM SURF ATTACK AGM-114K (HELLFIRE)	26	EA
RT	R-2202/DTA RLOD	MUN	1410013810715	PV30	GM SURF ATTACK AGM-114K (HELLFIRE)	26	EA
RT	R-2202/DTA RLOD	MUN	1340011490918	H108	RCKT POD 298MM PRAC M28 MLRS	2	EA
RT	R-2202/DTA RLOD	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	3,688	EA
RT	R-2202/DTA RLOD	MUN	1320005297331	D544	PROJ 155MM HE M107	9	EA
RT	R-2202/DTA RLOD	MUN	1376007809203		BLACK PWDR BULK (BLACK PWDR)	8	EA
RT	R-2202/DTA RLOD	MUN			Aluminized propellant [C-4 1st stage]	2,515	LB

Event Record

Report Selection Criteria
Activities: **Range Training**
Areas: **R-2202/DTA JCALF**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	R-2202/DTA JCALF	MUN	1305007661147	A769	CTG 20MM 1 HEI M97/1 INC M96/1 AP-T M95	9,788	EA
RT	R-2202/DTA JCALF	MUN	1305008391302	A874	CTG 20MM TP MK105 MOD0	4,788	EA
RT	R-2202/DTA JCALF	MUN	1305012689373	B129	CTG 30MM HEDP M789	22,063	EA
RT	R-2202/DTA JCALF	MUN	1325007106773	E464	BOMB GP 250LB MK81 MOD1	60	EA
RT	R-2202/DTA JCALF	MUN		E9aa	BOMB PRAC BDU-33, CXU-3A/B SIGNAL CTG	334	EA
RT	R-2202/DTA JCALF	MUN		E9ar	BOMB PRAC BDU-45/B, CONICAL FIN, MK4 MOD3 SIGNAL CTG	64	EA
RT	R-2202/DTA JCALF	MUN	1325012946384	F013	BOMB PRAC BDU-50A/B	150	EA
RT	R-2202/DTA JCALF	MUN	1325013765088	E756	BOMB PRAC BDU-56/B INERT LOADED	113	EA
RT	R-2202/DTA JCALF	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	212	EA
RT	R-2202/DTA JCALF	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	202	EA
RT	R-2202/DTA JCALF	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	357	EA
RT	R-2202/DTA JCALF	MUN	1325001281066	E511	BOMB GP 1000LB MK83 MOD4 INERT LOADED	79	EA
RT	R-2202/DTA JCALF	MUN	1325007106765	F127	BOMB GP 2000LB MK84 MOD2	65	EA
RT	R-2202/DTA JCALF	MUN	1325001024261	E508	BOMB GP 1000LB MK83 MOD4	195	EA
RT	R-2202/DTA JCALF	MUN	1325007106773	E464	BOMB GP 250LB MK81 MOD1	200	EA
RT	R-2202/DTA JCALF	MUN	1310001437021	B632	CTG 60MM HE M49A4	486	EA
RT	R-2202/DTA JCALF	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	135	EA
RT	R-2202/DTA JCALF	MUN	1315005420179	C223	CTG 81MM HE M362 W/O FUZE	218	EA
RT	R-2202/DTA JCALF	MUN	1315010127094	C445	CTG 105MM HE M1 W/O FUZE	2,635	EA
RT	R-2202/DTA JCALF	MUN	1315012929868	C787	CTG 120MM HEAT-MP-T M830	8	EA
RT	R-2202/DTA JCALF	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	779	EA
RT	R-2202/DTA JCALF	MUN	1315011656487	C784	CTG 120MM TP-T M831	48	EA
RT	R-2202/DTA JCALF	MUN	1320005297348	D485	PROJ 155MM HE M101	1,615	EA
RT	R-2202/DTA JCALF	MUN	1340001436889	H490	RCKT HE 2.75IN W/WHD M151 & FUZE M423	99	EA
RT	R-2202/DTA JCALF	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	4	EA
RT	R-2202/DTA JCALF	MUN		C995	CTG & LNCHR 84MM M136 AT-4 (surrogate)	50	EA
RT	R-2202/DTA JCALF	MUN	1427001638959	PL23	GM & LAU SURF ATTACK M222 (DRAGON)	1	EA
RT	R-2202/DTA JCALF	MUN	1410013810715	PV30	GM SURF ATTACK AGM-114K (HELLFIRE)	8	EA
RT	R-2202/DTA JCALF	MUN	1340011490918	H108	RCKT POD 298MM PRAC M28 MLRS	2	EA
RT	R-2202/DTA JCALF	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	502	EA
RT	R-2202/DTA JCALF	MUN	1320005297331	D544	PROJ 155MM HE M107	3	EA
RT	R-2202/DTA JCALF	MUN	1376007809203		BLACK PWDR BULK (BLACK PWDR)	8	EA
RT	R-2202/DTA JCALF	MUN			Aluminized propellant [C-4 1st stage]	2,515	LB

Event Record

Report Selection Criteria

Activities: **Range Training**

Areas: **Yukon Baseline**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	Yukon Baseline	MUN	1305001437163	A131	CTG 7.62MM 4 BALL M80/1 TR M62	78,125	EA
RT	Yukon Baseline	MUN	1305001437049	A814	CTG 20MM 2 AP-T M95/2 INC M96	9,144	EA
RT	Yukon Baseline	MUN	1305007661147	A769	CTG 20MM 1 HEI M97/1 INC M96/1 AP-T M95	23,113	EA
RT	Yukon Baseline	MUN	1305012991674	A976	CTG 25MM TP-T M793	750	EA
RT	Yukon Baseline	MUN	1305013569838	A974	CTG 25MM APDS-T M791	75	EA
RT	Yukon Baseline	MUN	1305012687274	B118	CTG 30MM TP M788	28,950	EA
RT	Yukon Baseline	MUN	1305012689373	B129	CTG 30MM HEDP M789	4,300	EA
RT	Yukon Baseline	MUN		E9aa	BOMB PRAC BDU-33, CXU-3A/B SIGNAL CTG	784	EA
RT	Yukon Baseline	MUN		E9ar	BOMB PRAC BDU-45/B, CONICAL FIN, MK4	34	EA
RT	Yukon Baseline	MUN	1325012946384	F013	BOMB PRAC BDU-50A/B	248	EA
RT	Yukon Baseline	MUN	1325013765088	E756	BOMB PRAC BDU-56/B INERT LOADED	95	EA
RT	Yukon Baseline	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	3	EA
RT	Yukon Baseline	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	165	EA
RT	Yukon Baseline	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	244	EA
RT	Yukon Baseline	MUN	1325001281066	E511	BOMB GP 1000LB MK83 MOD4 INERT LOADED	5	EA
RT	Yukon Baseline	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	15	EA
RT	Yukon Baseline	MUN	1325001024261	E508	BOMB GP 1000LB MK83 MOD4	5	EA
RT	Yukon Baseline	MUN	1325007106765	F127	BOMB GP 2000LB MK84 MOD2	5	EA
RT	Yukon Baseline	MUN	1310001437021	B632	CTG 60MM HE M49A4	1,244	EA
RT	Yukon Baseline	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	2,048	EA
RT	Yukon Baseline	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	1,979	EA
RT	Yukon Baseline	MUN	1315005420179	C223	CTG 81MM HE M362 W/O FUZE	327	EA
RT	Yukon Baseline	MUN	1315012929868	C787	CTG 120MM HEAT-MP-T M830	187	EA
RT	Yukon Baseline	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	1,091	EA
RT	Yukon Baseline	MUN	1315011656487	C784	CTG 120MM TP-T M831	3,532	EA
RT	Yukon Baseline	MUN	1320005297348	D485	PROJ 155MM HE M101	2,160	EA
RT	Yukon Baseline	MUN	1320005297331	D544	PROJ 155MM HE M107	361	EA
RT	Yukon Baseline	MUN	1320005555126	D570	CTG 165MM HEP M123A1 (COMP A3)	89	EA
RT	Yukon Baseline	MUN	1340001436889	H490	RCKT HE 2.75IN W/WHD M151 & FUZE M423	118	EA
RT	Yukon Baseline	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	1,540	EA
RT	Yukon Baseline	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	4,880	EA
RT	Yukon Baseline	MUN			Aluminized propellant [C-4 1st stage]	180	LB
RT	Yukon Baseline	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	320	EA
RT	Yukon Baseline	MUN	1325001024261	E508	BOMB GP 1000LB MK83 MOD4	15	EA
RT	Yukon Baseline	MUN	1325007106765	F127	BOMB GP 2000LB MK84 MOD2	40	EA

Event Record

Report Selection Criteria
Activities: **Range Training**
Areas: **Yukon JCALF**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	Yukon JCALF	MUN	1305010920429	A976	CTG 25MM TP-T M793	225	EA
RT	Yukon JCALF	MUN	1305013569838	A974	CTG 25MM APDS-T M791	75	EA
RT	Yukon JCALF	MUN	1305012687274	B118	CTG 30MM TP M788	5,675	EA
RT	Yukon JCALF	MUN	1305012689373	B129	CTG 30MM HEDP M789	4,300	EA
RT	Yukon JCALF	MUN		E9aa	BOMB PRAC BDU-33, CXU-3A/B SIGNAL CTG	784	EA
RT	Yukon JCALF	MUN		E9ar	BOMB PRAC BDU-45/B, CONICAL FIN, MK4 MOD3 SIGNAL CTG	34	EA
RT	Yukon JCALF	MUN	1325012946384	F013	BOMB PRAC BDU-50A/B	248	EA
RT	Yukon JCALF	MUN	1325013765088	E756	BOMB PRAC BDU-56/B INERT LOADED	95	EA
RT	Yukon JCALF	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	3	EA
RT	Yukon JCALF	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	156	EA
RT	Yukon JCALF	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	213	EA
RT	Yukon JCALF	MUN	1325001281066	E511	BOMB GP 1000LB MK83 MOD4 INERT LOADED	5	EA
RT	Yukon JCALF	MUN	1325010081335	F267	2000LB GP BOMB BODY ASSY MK84 MOD4	15	EA
RT	Yukon JCALF	MUN	1325009123867	F244	BOMB GP 500LB MK82 MOD1 INERT LOADED	9	EA
RT	Yukon JCALF	MUN	1325007106769	E482	BOMB GP 500LB MK82 MOD1	211	EA
RT	Yukon JCALF	MUN	1325001024261	E508	BOMB GP 1000LB MK83 MOD4	20	EA
RT	Yukon JCALF	MUN	1325007106765	F127	BOMB GP 2000LB MK84 MOD2	45	EA
RT	Yukon JCALF	MUN	1310001437021	B632	CTG 60MM HE M49A4	1,244	EA
RT	Yukon JCALF	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	140	EA
RT	Yukon JCALF	MUN	1315005420179	C223	CTG 81MM HE M362 W/O FUZE	327	EA
RT	Yukon JCALF	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	365	EA
RT	Yukon JCALF	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	365	EA
RT	Yukon JCALF	MUN	1315012929868	C787	CTG 120MM HEAT-MP-T M830	187	EA
RT	Yukon JCALF	MUN	1315013431941	C623	CTG 120MM HE M933 W/PD FUZE M745	1,091	EA
RT	Yukon JCALF	MUN	1315011656487	C784	CTG 120MM TP-T M831	296	EA
RT	Yukon JCALF	MUN	1320005297348	D485	PROJ 155MM HE M101	2,160	EA
RT	Yukon JCALF	MUN	1320005555126	D570	CTG 165MM HEP M123A1 (COMP A3)	89	EA
RT	Yukon JCALF	MUN	1340001436889	H490	RCKT HE 2.75IN W/WHD M151 & FUZE M423	118	EA
RT	Yukon JCALF	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	462	EA
RT	Yukon JCALF	MUN			Aluminized propellant [C-4 1st stage]	180	LB
RT	Yukon JCALF	MUN	1305001437163	A131	CTG 7.62MM 4 BALL M80/1 TR M62	23,438	EA
RT	Yukon JCALF	MUN	1305007661147	A769	CTG 20MM 1 HEI M97/1 INC M96/1 AP-T M95	23,113	EA

Event Record

Report Selection Criteria

Activities: **Range Training**

Areas: **DMPTR JCALF**

Activity	Area	Entry Method	NSN	DODIC/NALC	Nomenclature or Common Name	Quantity	Unit
RT	DMPTR JCALF	MUN	1305001437163	A131	CTG 7.62MM 4 BALL M80/1 TR M62	54,688	EA
RT	DMPTR JCALF	MUN	1305001437049	A814	CTG 20MM 2 AP-T M95/2 INC M96	9,144	EA
RT	DMPTR JCALF	MUN	1305010920429	A976	CTG 25MM TP-T M793	525	EA
RT	DMPTR JCALF	MUN	1305012687274	B118	CTG 30MM TP M788	23,275	EA
RT	DMPTR JCALF	MUN	1310000963073	B621	CTG IGN M4 F/60MM MORTAR	1,908	EA
RT	DMPTR JCALF	MUN	1315000284983	C239	CHG PROP INCREM M2A1 F/81MM MORTAR	1,614	EA
RT	DMPTR JCALF	MUN	1315011656487	C784	CTG 120MM TP-T M831	3,236	EA
RT	DMPTR JCALF	MUN	1320005297331	D544	PROJ 155MM HE M107	361	EA
RT	DMPTR JCALF	MUN	1340011088850	H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	1,078	EA
RT	DMPTR JCALF	MUN	1315001137649	C505	CTG 105MM APDS-T M392A2	4,880	EA

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Appendix K
Mitigations, Best Management Practices, and Standard Operating Procedures

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ACRONYMS AND ABBREVIATIONS

1/25 SBCT	1st Brigade, 25th Infantry Division, Stryker Brigade Combat Team
ABCT	Air Brigade Combat Team
ADFG	Alaska Department of Fish and Game
AFB	Air Force Base
AFI	Air Force Instruction
ANG	Army National Guard
AR	Army Regulation
ATCAA	Air Traffic Control Assigned Airspace
BAX	Battle Area Complex
CACTF	Combined Arms Collective Training Facility
CEQ	Council on Environmental Quality
DTA	Donnelly Training Area
DZ	drop zone
EA	environmental assessment
FNSI	Finding of No Significant Impact (Army)
FONSI	Finding of No Significant Impact (Air Force)
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
JBER	Joint Base Elmendorf-Richardson
JPARC	Joint Pacific Alaska Range Complex
LRAM	Land Rehabilitation and Maintenance
MFE	major flying exercise
MOA	Military Operations Area
MTR	Military Training Route
NEPA	National Environmental Policy Act
ROD	Record of Decision
RTLA	Range and Training Land Assessment
SBCT	Stryker Brigade Combat Team
SOP	standard operating procedure
SUA	Special Use Airspace
USAG-FWA	U.S. Army Garrison Fort Wainwright, Alaska
USARAK	U.S. Army Alaska
USFWS	U.S. Fish and Wildlife Service

APPENDIX K MITIGATIONS, BEST MANAGEMENT PRACTICES, AND STANDARD OPERATING PROCEDURES

K.1 EXISTING MEASURES TO REDUCE IMPACTS (ARMY)

Army Regulation (AR) 350-19, *Army Sustainable Range Program* defines the Army's role in maintaining its range lands for repetitive and future use and AR 200-1, *Environmental Protection and Enhancement* provides environmental considerations and environmental stewardship principles for the Army mission and all Army activities. Established Army programs such as the Integrated Training Area Management (ITAM), which includes Range and Training Land Assessment (RTLA) and Land Rehabilitation and Management (LRAM), help monitor and repair environmental adverse effects caused by military training to foster sustainability. In addition, the Army has standard operating procedures (SOPs) and utilizes best management practices (BMPs) to help maintain sustainability and foster environmental stewardship.

Both U.S. Army Alaska (USARAK) and U.S. Army Garrison Fort Wainwright, Alaska (USAG-FWA) have in recent years produced a variety of National Environmental Policy Act (NEPA) analyses evaluating several actions, including Army force transformation efforts, the addition of Soldiers and new equipment, a general increased use of training lands, and range development projects throughout USARAK ranges. These documents have also identified many regulations, policies, management programs, and specific mitigation measures used to avoid, minimize and mitigate various adverse impacts to the affected environment at Fort Wainwright. The following documents (incorporated by reference) provide a synopsis of previous environmental analysis of USARAK Transformation, stationing actions, and evolution of day-to-day operations. These mitigation measures are ongoing and will continue as part of the baseline management employed by the Army in Alaska on Army-owned and controlled lands.

Transformation of U.S. Army Alaska Final EIS, May 2004. This document analyzes the impacts to USARAK lands and surrounding communities and land users associated with the transformation of the 172nd Infantry Brigade (Separate) at Fort Wainwright and Joint Base Elmendorf-Richardson (JBER) into the 1st Brigade, 25th Infantry Division Stryker Brigade Combat Team (1/25 SBCT). This environmental impact statement (EIS) will serve as a foundational reference source for this EIS, particularly in regards to JBER and Fort Wainwright.

The Battle Area Complex/Combined Arms Collective Training Facility (BAX/CACTF) Final EIS, June 2006. This document provides an environmental analysis of construction and operation of a combat training facility at Donnelly Training Area East (DTA-East). That EIS focuses on the existing environment at DTA-East and provides a comprehensive description of existing resources. The BAX/CACTF EIS (2006) will serve as a foundational reference source for this EIS, particularly in regards to DTA. There is an existing Memorandum of Agreement (USARAK-MOA-029), signed 16 May 2006, between USARAK and the City of Delta Junction. The agreement lays out specific operational actions and restrictions that apply to the use and management of the existing BAX and CACTF in DTA-East (USARAK 2006-3). Mitigations as outlined in the BAX and CACTF Final EIS (dated June 2006) and ROD (signed 19 July 2006) remain in effect and will not be superseded unless a better-practice, enhanced, stringent mitigation is implemented as part of this EIS.

Conversion of the Airborne Task Force to an Airborne Brigade Combat Team (ABCT) Environmental Assessment (EA), 2006. This document analyzes the impacts associated with conversion of the existing airborne task force into the 4/25 ABCT at JBER.

Stationing and Training of Increased Aviation Assets within U.S. Army Alaska Final EIS, August 2009. That EIS analyzes the impact of stationing a task force-sized aviation unit at Fort Wainwright. In addition, the impacts of helicopter training on Army lands was evaluated, including the identification of several mitigation measures to lessen the adverse impact on various resource areas.

Range Complex and Training Land Upgrades Programmatic EA, 2010. This programmatic document provides a management framework for range planners and ITAM coordinators to use when evaluating potential impacts to the environment. This EIS provides a comprehensive list of BMPs and SOPs for use when designing range or training land upgrades.

Environmental Assessment for Donnelly Training Area East Mobility and Maneuver Enhancements, Fort Wainwright, Alaska, 2008. This document analyzes the impacts associated with the expansion of the Donnelly Drop Zone (DZ), trail improvements and creation of a hardened bivouac to accommodate changing mission requirements at DTA.

U.S. Army Pacific Supplemental Programmatic EIS for Army Growth and Force Structure Realignment, 2008. This document evaluates the effects associated with growing and realigning the Army’s force structure to support military operations in the Pacific Theater, including the addition of approximately 2,200 new Soldiers in Alaska.

USAG Alaska Grow the Army Force Structure Realignment EA, 2008. Tiering off the above EIS, this document evaluates the effects associated with facility construction and training actions to accommodate new military units to be stationed in Alaska. The EA analyzes site-specific facility and range construction as well as increased training that will be necessary to support incoming Soldiers and their Families.

The Integrated Natural Resource Management Plan (INRMP) 2007-2011 and 2007 INRMP EA, January 2007. These documents describe standard policies and procedures for managing natural resources to ensure sustainability of USARAK lands.

The Integrated Cultural Resource Management Plan (ICRMP), 2001. This document outlines treatment for and management of USARAK cultural resources.

ITAM Plan and ITAM EA, October 2005 and June 2005, respectively. These documents focus on managing sustainable use of training areas and provide recommended measures to achieve sustainability and rehabilitation of lands impacted by training.

Army Small Arms Training Range Environmental Best Management Practices, 2005. This document provides a manual of BMPs used on Small Arms Training Ranges.

Alaska Army Lands Withdrawal Renewal Final Legislative EIS, 1999. This document demonstrates the need for and examines the renewal of the existing military withdrawals of Fort Wainwright Yukon Training Area (YTA), Fort Greely West Training Area and Fort Greely East

Training Area from public use for military purposes until November 6, 2051. Fort Greely West and East Training Areas have subsequently been renamed DTA-West and DTA-East training areas.

Range Upgrade/Expansion Projects for Fort Richardson, Alaska, Final Finding of No Significant Impact (FNSI) and EA, 2002. This document examines environmental impacts associated with upgrade and construction of two new ranges at JBER.

Range Upgrade/Expansion Projects for Fort Wainwright, Alaska, FNSI and EA, 2003. This document examines environmental impacts associated with upgrade of existing ranges and related facilities and the construction of new ranges at Fort Wainwright.

Department of Army Pamphlet (PAM) 350-38, *Standards in Training Commission.* This regulation establishes Army policy and responsibilities for the use and maintenance of training aids, devices, simulators, and simulations, including tactical engagement simulations, targets, targetry, combat training center and range instrumentation, and training-unique ammunition. In addition, this regulation sets forth the policies and procedures for the identification, approval, prioritization, development, and fielding of graphic training aids to support Army-wide requirements.

AR 385-63, *Range Safety.* This regulation prescribes Department of the Army Headquarters range safety policies and responsibilities for firing ammunition, lasers, guided missiles, and rockets and provides guidance for the application of risk management in range operations.

PAM 385-63, *Range Safety.* This pamphlet provides implementation guidance for the Army Range Safety Programs prescribed in AR 385–63. It provides standards and procedures for the safe firing of ammunition, demolitions, lasers, guided missiles, and rockets for training, target practice, and to the extent practicable, combat.

AR 385-64, *U.S. Army Explosives Safety Program.* This regulation prescribes Army safety policy, standards, responsibilities, and procedures for implementing and maintaining the U.S. Army Explosives Safety Program. It sets explosives safety standards to protect Soldiers, civilian employees, family members, contractors, the general public, and the environment.

PAM 385–64, *Ammunition and Explosives Safety Standards*. This pamphlet explains the Army's safety criteria and standards for operations involving ammunition and explosives prescribed by AR 385–64, for the Army and contractor operations on Government property.

United States Army Alaska Regulation 350-2, *Training*. This regulation provides procedures for planning, requesting, and operating ranges and training areas within USARAK. It mandates specific safety policies for munitions use as required by Army regulations. Highlights include the range safety certification program, environmental considerations, and guidelines for medical support, demolitions training, and laser operations. Specific chapters provide procedures for scheduling, ammunition handling, direct fire, indirect fire, special ranges, airspace, nonfiring ranges, and training areas.

Training Circular 25-8, *Training*. This circular provides guidance for developing and operating Army ranges. It is a working guide for trainers, range and mobilization planners, engineers,

coordinators, and range project review boards at all levels of the Active Army, Army National Guard (ANG), and Army Reserve. It is the primary guide for installation and major Army command range development plans and for developing the Army Master Range Plan.

K.2 EXISTING MEASURES TO REDUCE IMPACTS (AIR FORCE)

Air Force Instruction (AFI) 32-7061, *Environmental Impact Analysis Process (EIAP),* adopts 32 CFR 989, *Environmental Impact Analysis Process,* which describes the specific tasks and procedures for successfully achieving and maintaining compliance with NEPA and the Council on Environmental Quality (CEQ) for implementing NEPA. AFI 32-7064, *Integrated Natural Resources Management,* addresses the management of natural resources on Air Force properties to comply with Federal, State and local standards. This instruction provides a framework for documenting and maintaining Air Force natural resources management programs on its installations and ranges.

The Air Force has prepared several NEPA analyses in recent years for actions that expand Special Use Airspace (SUA), beddown operational and training units and aircraft (and associated mission operations), and construct of physical improvements at air bases in Alaska. Similar to the Army, these documents have identified many regulations, policies, management programs, and specific mitigation measures used to avoid, minimize and mitigate various adverse impacts to the affected environments. The documents summarized below (incorporated by reference) provide a synopsis of previous environmental analysis reflecting the evolution of mission requirements by Air Force units and day-to-day operations in Alaska. These mitigation measures are ongoing and will continue as part of the baseline management employed by the Air Force for existing SUAs that are included in the JPARC EIS area of operations. Actions undertaken by the Air Force that take place on Army lands in Alaska would incorporate the applicable existing mitigations and BMPs that govern the use of those specific lands.

Establish the Delta Military Operations Area (MOA) Complex EA. 2010. The Air Force proposed to improve required training for major flying exercises (MFEs) by charting the Delta MOA Complex. The proposed action established connecting airspace between other adjacent MOAs to provide a realistic setting for MFEs. The action provided contiguous airspace connecting MOAs to existing restricted airspace to better meet MFE training objectives.

Eielson Air Force Base (AFB) Infrastructure Development in Support of RED FLAG–Alaska EA. 2007. The Air Force proposed and implemented infrastructure improvements on Eielson AFB. The EA provided a framework and programmatic approach to planning, environmental documentation, and tracking to support infrastructure improvements to fulfill mission needs and those supporting the RED FLAG–Alaska MFE.

F-22 Beddown at Elmendorf AFB Alaska, EA/Finding of No Significant Impact (FONSI). 2006. The EA evaluated the beddown of two F-22A operational squadrons over a period of approximately 5 years. It assessed all aspects of the beddown, including sorties at the airfield and in regional military training airspace, construction of and renovations to facilities and infrastructure to support the F-22A Operational Wing, and personnel changes. The two F-22A squadrons replaced one squadron of F-15C and one squadron of F-15E aircraft designated to leave Elmendorf AFB. F-22A training operations were assessed to use MOAs, Air Traffic

Control Assigned Airspace (ATCAA), Military Training Routes (MTRs), and ranges where F-15C and F-15E aircraft had trained.

Final Alaska MOA EIS. 1997. The Air Force prepared an EIS evaluating the potential environmental effects of restructuring and using SUA in Alaska for flight training and exercises. The purpose of the proposed action was to restructure and upgrade several MOAs in Alaska. The proposed action was needed to ensure that military aircrews were able to receive comprehensive and realistic tactical flying training in the safest airspace possible.

C-17 Training Areas Final EA Elmendorf AFB, Alaska. November 2005. The EA considered C-17 training operations in military training airspace in Alaska. The project also includes upgrading Runway 07/25 at Allen Army Airfield (AAF), frequent use of the runway as a C-17 assault landing zone, frequent use of five existing DZs for C-17 training and C-17 operations in Delta MOA.

The FONSIs for several of these EAs describe measures adopted to reduce impacts from these actions. Many of these apply to the MOAs and Air Force training operations that overlap with the Joint Pacific Alaska Range Complex (JPARC) EIS actions and areas of operations.

K.3 PROPOSED MITIGATIONS FOR JPARC EIS PROPOSALS

Table K-1 and Table K-2 present proposed mitigations for the six definitive proposals evaluated in the EIS. Table K-1 presents proposed mitigations for the Air Force's Fox 3 and new Paxon MOA, RLOD, and NJT proposals. Table K-2 presents the Army's proposed mitigations for the BAX, Expand R2205, and UAV corridor proposals. The decision document (or Record of Decision [ROD]) for this EIS will identify mitigations that would be adopted and implemented as part of the proposed actions. Decisionmakers will give serious consideration to adopting mitigations that allow implementation of the proposed actions without compromising their purpose and need.

Table K-1. Air Force – Proposed Mitigations

Benefitting Resource	Proposed Mitigation
Fox 3 MOA Expansion and New Paxon MOA	
Airspace Management Safety-Flight Land Use-Access	**Special Use Airspace Information System** Continue SUAIS in all areas where radio coverage exists; this includes a majority of the area beneath the proposed Fox 3 and Paxon MOAs. The SUAIS Letter of Agreement with the FAA will be updated to include current radio sites and any new MOAs to be covered by the system. The effectiveness of this mitigation in maintaining a safe, usable airspace can be seen in today's northern MOAs, which have minimum altitudes even lower than proposed here. The Air Force safely shares large expanses of airspace with civilian aviation utilizing the communication network known as SUAIS. Proposed new, low MOAs already have large areas of SUAIS coverage that would enable safe, simultaneous use of these new airspaces by civil and military aircraft.
Biological Resources	**Eagle and Migratory Bird Avoidance** Limit minimum altitude to 1,000 feet AGL in the new Fox 3 and Paxon MOAs from 15 March to 30 September (nesting season) to comply with the Bald and Golden Eagle Protection Act (BGEPA). Subject to available funding, the AF may coordinate with the U.S. Fish and Wildlife Service (USFWS) to establish habitat models and/or conduct bald and golden eagle nest surveys to establish low flying (500 feet AGL) areas outside of eagle habitat during the nesting season (15 March to 30 September).
	Wildlife Avoidance Modify existing Letter of Agreement (LOA) with Alaska Department of Fish and Game (ADFG) to maintain avoidance areas over caribou and Dall sheep populations under the new MOAs during critical lifecycle periods. Coordination with wildlife agencies will continue to determine specifics including seasons and minimum overflight altitudes; location of herds is monitored/reported by ADFG.
Airspace Management Safety-Flight Biological Resources Land Use-Management, Access, Recreation Socioeconomics Subsistence	**VFR Flight Corridors** Extend the VFR flight corridor over the Richardson Highway between Delta Junction and Glennallen to include the highway segment under the new Paxon MOA. The corridor laterally will be 3 miles on either side of the Richardson Highway and vertically go from the surface up to 4,500 feet MSL. (The MOA would only go down to 5,000 feet MSL over the corridor to allow a 500-foot buffer.) As an extra safety measure, designated VFR corridors are intended to be free of high-speed Air Force aircraft, thereby allowing unimpeded flight by civilian aircraft. Corridors such as this have been used extensively for the safe transit of civilian aircraft where the military currently flies low in MOAs. This new corridor would continue to allow unimpeded VFR flights below the floor of the proposed Paxon low MOA. An additional benefit of the VFR corridor is a reduced noise level over the Paxson Fish Hatchery from the higher flying military aircraft.
Biological Resources Land Use-Management, Recreation	**National Wild and Scenic Rivers Protection** For the period 15 May to 30 September, expand the Gulkana (west, middle, and north forks) and Delta NWSR (and others, as designated) Flight Avoidance Areas to include portions within new MOA boundaries using a 5-nautical mile buffer either side of the river centerline with 5,000 feet MSL minimum altitude. The river corridors will include their headwater lakes areas (Tangle Lakes and Dickey Lake).

Table K-1. Air Force Proposed Mitigations *(continued)*

Benefitting Resource	Proposed Mitigation
Fox 3 MOA Expansion and New Paxon MOA (Definitive) *(continued)*	
Land Use-Management, Recreation Socioeconomics	**Concentrated Activity Areas** Comply with flight avoidance areas established by the 11th AF Airspace and Range Team and listed in the 11th AF Airspace Handbook. Areas not specified by the Record of Decision (ROD) may be added, increased, decreased, or removed by the 11th AF Airspace and Range team as situations dictate (e.g., a mine and its air operations cease to exist).
Night Joint Training (Definitive)	
Airspace Management Safety-Flight Biological Resources Land Use-Management, Access, Recreation Socioeconomics Subsistence	**VFR Flight Corridors** Extend the VFR flight corridor over the Richardson Highway between Delta Junction and Glennallen to include the highway segment under the new Paxon MOA. The corridor laterally will be 3 miles on either side of the Richardson Highway and vertically go from the surface up to 4,500 feet MSL. (The MOA would only go down to 5,000 feet MSL over the corridor to allow a 500-foot buffer.) As an extra safety measure, designated VFR corridors are intended to be free of high-speed Air Force aircraft, thereby allowing unimpeded flight by civilian aircraft. Corridors such as this have been used extensively for the safe transit of civilian aircraft where the military currently flies low in MOAs. This new corridor would continue to allow unimpeded VFR flights below the floor of the proposed Paxon low MOA. An additional benefit of the VFR corridor is a reduced noise level over the Paxson Fish Hatchery from the higher flying military aircraft.
Biological Resources Land Use-Management	**National Wild and Scenic Rivers Protection** For the period 15 May to 30 September, expand the Gulkana (west, middle, and north forks) and Delta NWSR (and others, as designated) Flight Avoidance Areas to include portions within new MOA boundaries using a 5-nautical mile buffer either side of the river centerline with 5,000 feet MSL minimum altitude. The river corridors will include their headwater lakes areas (Tangle Lakes and Dickey Lake).
Land Use-Management, Recreation Socioeconomics	**Concentrated Activity Areas** Comply with flight avoidance areas established by the 11th AF Airspace and Range Team and listed in the 11th AF Airspace Handbook. Areas not specified by the ROD may be added, increased, decreased, or removed by the 11th AF Airspace and Range team as situations dictate (e.g., a mine and its air operations cease to exist).
Realistic Live Ordnance Delivery (Definitive)	
Land Use-Management, Access Socioeconomics	**State Land/Leasehold Avoidance** Comply with Alaska Department of Natural Resources (ADNR) comments to avoid leasehold properties in the north and south corners of the proposed restricted area by adjusting the borders of the Alternative A airspace.
Safety-Ground Land Use-Management	**ADNR Compliance Items** Air Force will provide support to ADNR throughout the Special Use Designation (SUD) process. The Air Force will develop a Concept of Operation (CONOPS) and an Access and Safety Plan for the exclusive use of State land to support RLOD. The SUD will identify areas and dates of closure and will have to indicate which activities are affected. The Access Plan will provide the maximum public use to the ground evacuation areas, closing such areas for the minimum period of time necessary to conduct such operations. The Access Plan (updated annually) will identify areas and dates of closure and will indicate which activities are affected. It will describe roles and responsibilities for securing the area, ensuring it is evacuated, publishing and posting closure notices, signs and other media to advertise and alert public of the hazards, times, and locations.

Table K-1. Air Force – Proposed Mitigations *(continued)*

Benefitting Resource	Proposed Mitigation
Realistic Live Ordnance Delivery (Definitive) *(continued)*	
Physical Resources Water Resources	**Continued compliance with Army regulations on R2202** All applicable conservation, monitoring, and management procedures currently followed by USAG-FWA in the management of R-2202 will be applicable to the Proposed Action, including measures for the protection of soils and permafrost, including but not limited to, the Fort Wainwright Integrated Natural Resource Management Plan (INRMP) and Storm Water Pollution Prevention Plan (SWPPP) and the monitoring guidelines of the Integrated Training Area Management (ITAM) Sustainable Range Awareness.

Key: 11th AF=11th Air Force; ADFG=Alaska Department of Fish and Game; ADNR= Alaska Department of Natural Resources; AGL=above ground level; BGEPA=Bald and Golden Eagle Protection Act; CONOPS=Concept of Operation; FAA=Federal Aviation Administration; INRMP=Integrated Natural Resources Management Plan; ITAM=Integrated Training Area Management**;** LOA=Letter of Agreement; MOA=Military Operations Area**;** MSL=mean sea level; NWSR=National Wild and Scenic River; RLOD=Realistic Live Ordnance Delivery; ROD=Record of Decision; SUAIS=Special Use Airspace Information System; SUD=Special Use Designation; SWPPP=Storm Water Pollution Prevention Plan; USFWS= U.S. Fish and Wildlife Service; VFR=Visual Flight Rules.

Table K-2. Army – Proposed Mitigations

Benefitting Resource	Proposed Mitigation
Battle Area Complex (BAX) Restricted Area (Definitive)	
Airspace	Pending the FAA's study of the preferred airspace proposal alternatives to determine specific impacts and mitigation measures to be taken to minimize any impacts on VFR and IFR air traffic, other existing mitigations would continue to be relevant in addressing potential impacts of the airspace proposals.
Biological Resources	Maintain consultation with USFWS with regard to compliance with Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act (MBTA). As required, conduct bald and golden eagle nest surveys in other areas where airspace modification would occur over previously unsurveyed areas. Coordinate the results with USFWS.
	Continue to monitor effects of military training including overflights on select wildlife species (especially herd animals, waterfowl, and raptors) and fisheries during critical seasons such as breeding, young-rearing, and migration. Use knowledge to develop and implement strategies to minimize disturbance to priority wildlife in existing and new SUAs and restricted airspace. This would help natural resources and range managers to coordinate training schedules that minimize impacts on wildlife populations.
	Continue pilot and soldier education awareness of sensitive wildlife species habitats and seasonal behaviors utilizing GIS mapping and discuss procedures to reduce disturbances and to increase safety by reducing potential for aircraft strikes.
	Continue effort to conduct a detailed study to assess the impacts and effects of noise on wildlife, particularly key species, such as caribou and bison during critical life cycle seasons. Use information to include protection requirements within a noise management plan.

Table K-2. Army – Proposed Mitigations *(continued)*

Benefitting Resource	**Proposed Mitigation**
Battle Area Complex (BAX) Restricted Area (Definitive) *(continued)*	
Cultural Resources	Mitigations for impacts to cultural resources are established through NHPA Section 106 consultation pursuant to 36 CFR 800. In compliance with Section 106 of the NHPA the Army has completed consultation with the Alaska SHPO and complied with all requirements for consultation with potentially affected Alaska Native Tribes, ANCSA corporations, and Tribal government entities to identify historic properties that may be affected, including TCPs, and develop management actions and mitigation measures to resolve any adverse effects, if required. It has been determined that significant adverse impacts to cultural resources and Alaska Native Tribes, ANSCA corporations, and Tribal government entities would not occur by the implementation of the BAX Restricted Area proposal. Mitigation measures include the amendment of the existing BAX Surface Danger Zone Programmatic Agreement to include the known and as yet undiscovered archaeological sites in the expanded BAX SDZ footprint. Specific Programmatic Agreement requirements are to survey new areas of the amended BAX SDZ within a period of five years from the amended agreement (9/9/12); add any sites that are discovered to the BAX SDZ monitoring plan; produce an annual report to the Alaska SHPO; update the Archaeological Resource Protection Act tri-fold handout and develop a placard describing cultural resources on the BAX SDZ that will be presented in the form of, at a minimum, one poster displayed at Range Control, and one interpretive panel placard to be displayed at an information kiosk located at the BAX range; and develop a cultural resource awareness PowerPoint presentation to be given to Soldiers and contractors to increase knowledge of cultural resource concerns and responsible actions, and knowledge of Alaska Native communities. All of the above mentioned requirements are either completed or in progress. Annual monitoring of archaeological sites within the BAX SDZ began in August of 2009 and will continue for 10 years from this date. In accordance with AR 200-1, all NHPA Section 106 consultation has been completed. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Army would manage these resources in accordance with the NHPA and other Federal and State laws, Air Force, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy.
Hazardous Materials Biological Resources Water Resources	The Army may augment the effort for their existing program to identify possible munitions contamination at training areas on DTA-East. This program initiates the collection of baseline data to determine the location, extent, and potential migration of munitions contamination in soils, surface water, and groundwater. Based on these preliminary results, a long-term monitoring program could be developed to assess cumulative impacts to the withdrawal lands from ongoing military activities. These results could identify areas needing restoration, activities that pose the greatest environmental threat, and the potential mitigation measures to be implemented. Extensive and expedient investigations may be conducted in those areas considered exposure pathways, such as streams.
Land Use - Access	The Army will update information and maps available to the public on the USARTRAK website to identify changes in public access restrictions for the expanded Army training activities within USAG-FWA training areas.
Land Use Biological Resources	The Military will maintain an open dialogue with ADNR, BLM, ADFG and USFWS to assess current conditions and needed adjustments in locations or temporal restrictions to avoidances and procedures put in place by the ROD for this EIS.
Land Use Safety - ground	The Army will expand enforcement to control trespass in DTA-East for the expanded operations.
Safety - Flight Safety	Maintain respective bird awareness programs to address potential bird and wildlife hazards that may exist.

Table K-2. Army – Proposed Mitigations *(continued)*

Benefitting Resource	Proposed Mitigation
Battle Area Complex (BAX) Restricted Area (Definitive) *(continued)*	
Safety - Ground	Continue fire management mitigations in accordance with current Army and USARAK Regulations on the BAX.
Socioeconomics Airspace	Pursue manning and funding for any enhancements required to expand situational awareness for air traffic in and around training areas for general and military aviation. Complete an internal study to identify coverage gaps in new SUAs and restricted airspace. One possible alternative is the establishment of a U.S. Army Airspace Information Center.
Subsistence	Continue consultation efforts with subsistence parties to determine current subsistence use levels and areas on USAG-FWA lands as input into scheduling. Continue tribal consultation efforts with subsistence users about hunting and fishing programs on USAG-FWA land. Continue to use a newsletter to provide information to subsistence users about existing and new military activities and the changes in access for subsistence users. Continue research and cooperative studies with Tribes to address possible effects of Air Force and Army activities on subsistence resources both directly within USAG-FWA installation boundaries and those outlying resources that may also be affected by military activities on DTA-West, DTA-East, YTA, and TFTA.
Expand Restricted Area R-2205, including the Digital Multi-purpose Training Range (DMPTR) (Definitive)	
Airspace	Pending the FAA's study of the preferred airspace proposal alternatives to determine specific impacts and mitigation measures to be taken to minimize any impacts on VFR and IFR air traffic, other existing mitigations would continue to be relevant in addressing potential impacts of the airspace proposals.
Biological Resources	Continue to monitor effects of military training including overflights on select wildlife species (especially herd animals, waterfowl, and raptors) and fisheries during critical seasons such as breeding, young-rearing, and migration. Use knowledge to develop and implement strategies to minimize disturbance to priority wildlife in existing and new SUAs and restricted airspace. This would help natural resources and range managers to coordinate training schedules that minimize impacts on wildlife populations.
Biological Resources	Continue pilot and soldier education awareness of sensitive wildlife species habitats and seasonal behaviors utilizing mapping and discuss procedures to reduce disturbances and to increase safety by reducing potential for aircraft strikes.
Biological Resources	Continue effort to conduct a study to assess the impacts and effects on wildlife, particularly key species, such as caribou and bison during critical life cycle seasons. Use information to include protection requirements within a management plan.
Cultural Resources	Mitigations for impacts to cultural resources are established through NHPA Section 106 consultation pursuant to 36 CFR 800. In compliance with Section 106 of the NHPA the Army has completed consultation with the Alaska SHPO and complied with all requirements for consultation with potentially affected Alaska Native tribes, ANCSA corporations, and Tribal government entities to identify historic properties that may be affected, including traditional cultural properties, and develop management actions and mitigation measures to resolve any adverse effects, if required. It has been determined that significant adverse impacts to cultural resources and Alaska Native tribes, ANCSA corporations, and Tribal government entities would not occur by the implementation of the BAX Restricted Area proposal. In accordance with AR 200-1, all NHPA Section 106 consultation has been completed. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Army would manage these resources in accordance with the NHPA and other Federal and State laws, Air Force, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy.

Table K-2. Army – Proposed Mitigations *(continued)*

Benefitting Resource	Proposed Mitigation
Expand Restricted Area R-2205, including the Digital Multi-purpose Training Range (DMPTR) (Definitive) *(continued)*	
Hazardous Materials Biological Resources	The Army may augment the effort for their existing program to identify possible munitions contamination at impact areas on YTA. This program initiates the collection of baseline data to determine the location, extent, and potential migration of munitions contamination in soils, surface water, and groundwater. Based on these preliminary results, a long-term monitoring program could be developed to assess cumulative impacts to the withdrawal lands from ongoing military activities. These results could identify areas needing restoration, activities that pose the greatest environmental threat, and the potential mitigation measures to be implemented. Extensive and expedient investigations may be conducted in those areas considered exposure pathways, such as streams.
Land Use Biological Resources	The Military will maintain an open dialogue with ADNR and BLM to assess current conditions and needed adjustments in locations or temporal restrictions to avoidances and procedures put in place by the ROD for this EIS.
Land Use Safety - ground	The Army would expand enforcement to control trespass in YTA for the expanded R-2205 activities.
Safety - Flight Safety	Continue efforts to comply with the respective Service formal flight safety programs, outlined in directives/regulations with supplements, that dictate those aircrew responsibilities and practices aimed at operating all manned and unmanned aircraft safely in existing modified and new SUAs.
Subsistence	Continue consultation efforts with subsistence parties to determine current subsistence use levels and areas on USAG-FWA lands as input into scheduling. Continue tribal consultation efforts with subsistence users about hunting and fishing programs on USAG-FWA land. Continue to use a newsletter to provide information to subsistence users about existing and new military activities and the changes in access for subsistence users. Continue research and cooperative studies with Tribes to address possible effects of Air Force and Army activities on subsistence resources both directly within USAG-FWA installation boundaries and those outlying resources that may also be affected by military activities on DTA-West, DTA-East, YTA, and TFTA.
Unmanned Area Vehicle (UAV) (Definitive)	
Airspace	Pending the FAA's study of the preferred airspace proposal alternatives to determine specific impacts and mitigation measures to be taken to minimize any impacts on VFR and IFR air traffic, other existing mitigations would continue to be relevant in addressing potential impacts of the airspace proposals.
Safety	Conduct sandhill crane surveys during spring and fall migration periods.
Safety - Flight Safety	Continue efforts to comply with the respective Service formal flight safety programs, outlined in directives/regulations with supplements, that dictate those aircrew responsibilities and practices aimed at operating all manned and unmanned aircraft safely in existing modified and new SUAs.
Subsistence	Continue consultation efforts with subsistence parties to determine current subsistence use levels and areas on USAG-FWA lands as input into scheduling. Continue tribal consultation efforts with subsistence users about hunting and fishing programs on USAG-FWA land. Continue to use a newsletter to provide information to subsistence users about existing and new military activities and the changes in access for subsistence users. Continue research and cooperative studies with Tribes to address possible effects of Air Force and Army activities on subsistence resources both directly within USAG-FWA installation boundaries and those outlying resources that may also be affected by military activities on DTA-West, DTA-East, YTA, and TFTA.

Key: ADFG=Alaska Department of Fish and Game; ADNR=Alaska Department of Natural Resources; AFI=Air Force Instruction; ANCSA=Alaska Native Claims Settlement Act; BAX=Battle Area Complex; BLM=Bureau of Land Management; CFR=Code of Federal Regulations; DMPTR=Digital Multi-Purpose Training Range; DoD=U.S. Department of Defense; DTA=Donnelly Training Area; EIS=Environmental Impact Statement; FAA=Federal Aviation Administration; IFR= Instrument Flight Rules; MBTA=Migratory Bird Treaty Act; NHPA=National Historic Preservation Act; ROD=Record of Decision; SDZ=surface danger zone; SHPO=State Historic Preservation Officer; SUA=Special Use Airspace; TFTA=Tanana Flats Training Area; UAV=Unmanned Aerial Vehicle; USAG-FWA=U.S. Army Garrison Fort Wainwright, Alaska; USARAK=U.S. Army Alaska; USARTRAK=Army Recreational Tracking System; USFWS= U.S. Fish and Wildlife Service; VFR=Visual Flight Rules; YTA=Yukon Training Area.

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Appendix L
Agency and Government Correspondence

TABLE OF CONTENTS

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APPENDIX L
AGENCY AND GOVERNMENT CORRESPONDENCE

L.1 COOPERATING AGENCY CORRESPONDENCE

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

OFFICE OF THE ASSISTANT SECRETARY

FEB 1 6 2011

SAF/IEI
1665 Air Force Pentagon
Washington, DC 20330-1665

Ms. Elizabeth L. Ray
Director, Airspace Services
Mission Support Services
Federal Aviation Administration
800 Independence Ave., SW, Suite 400 East
Washington, DC 20591

Dear Ms. Ray:

The Air Force and the Army jointly request your formal participation in the preparation of an Environmental Impact Statement (EIS) for the Joint Pacific Alaska Range Complex (JPARC) as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR § 1501.6 *Cooperating Agencies*.

As the lead agencies for the JPARC EIS, the Air Force and the Army request you participate in various portions of the EIS development as may be required. Specifically the Air Force and the Army ask for your support as a Cooperating Agency by:

a. Participating in the scoping process

b. Assuming responsibility, upon request by the Army and Air Force, for developing information and preparing analyses on issues for which you have special expertise

c. Making staff available for interdisciplinary reviews

To avoid unnecessary delays in the NEPA process, the Air Force and the Army will provide appropriate information and related materials in a timely fashion to enable your agency to complete its review and respond promptly. Should you or your staff have any questions regarding this letter, our point of contact is Mr. Jamie Spell, Alaskan Command, Staff Engineer, (907) 552-1695.

Sincerely,

Kathleen I. Ferguson

KATHLEEN I. FERGUSON, P.E.
Deputy Assistant Secretary of the Air Force
(Installations)

cc:
SAF/IEE
SAF/GCN
HQ USAF/A7C
HQ USAF/A3O
HQ PACAF/A7PI
ALCOM/J42

Federal Aviation Administration

Memorandum

Date: March 4, 2011

To: John Warner, Group Manager, Operations Support Group, AJV-W

From: Kent D. Peterson, Alaska District Manger, TWA-A11

Subject: JPARC Response for the Anchorage Terminal Airspace

After completing an initial review of the Joint Pacific Alaska Range Complex Proposal, the Alaska District has determined there are four concerns within the Fairbanks Terminal Airspace and one concern within the Anchorage Terminal Airspace.

Fairbanks

Proposal 2: Realistic Live Ordinance Delivery

Alternative A, B and C will have an impact on the ability of Fairbanks ATCT and Anchorage ARTCC controllers to use the Charlie arrival and departure gate. Of the three, proposal A may allow use of this gate but would require review of the procedures to ensure that aircraft do not encroach on the proposed expansion of R-2202 B, C, and D. Proposals B and C would eliminate the use of this gate during active times of R-2202/R-2211.

Proposal 3: Joint Combined Arms Live Fire (JCALF)

The expansion of the Yukon Training Area would release airspace north of Eielson AFB, clockwise to the southeast of Eielson. This would be an expansion of R-2205 and would have an impact on departures at Eielson. Current procedures would not be separated from the proposed area. Reroutes of Eielson traffic to avoid this area would impact a significant part of VFR/IFR traffic working in and around the Fairbanks, North Pole and Ladd Army Airfield.

Proposal 4: Night Joint Training

Currently, Anchorage ARTCC controls the Fairbanks Airspace between 2300L and 0600L, daily. In the event the night joint training was approved, an evaluation of which air traffic facility (Fairbanks Airport Traffic Control Tower or Anchorage Air Route Traffic Control Center) could provide the best service would need to be accomplished.

Proposal 5: Remotely Piloted Aircraft (RPA)/Unmanned Aerial Vehicle (UAV)Access

All of the corridors require separation from these areas and would require further mapping so controllers can ensure separation is maintained. Corridor A, C and F are proposed to be eight nautical miles wide from 3000 feet AGL to 17,999 MSL. These would restrict the ability to use T-232, V-444 and J-502/J-515. Additionally, corridor A is in an area of very high VFR/IFR training area for the Fairbanks ATCT airspace. This would impact the ability and options for controllers when conducting these operations. Corridor B is proposed to be five nautical miles wide from 1000 feet AGL to 5000 feet AGL. This would impact arrivals and departures at both Ladd Army Airfield and Eielson Air Force Base. Chena Beacon is the missed approach fix for Fairbanks and would be impacted by the implementation of this corridor. Corridors A and B would impact IFR operations in and out of the Fairbanks airspace as well as Ladd Army Airfield. All of these corridors effectively establish a wall that restricts non-participating aircraft from operating during times of activation. Depending on the separation requirement, the protected airspace may result in a much larger impact than described.

Corridor D would restrict the use of Charlie departure and arrival gate between Fairbanks ATCT and Anchorage ARTCC.

Although corridor G is well outside of Fairbanks ATCT airspace, it may impact the ability of aircraft to use T-232 and V-444.

Anchorage

Proposal 1: Fox 3 Military Operations Area (MOA) Expansion and New Paxon MOA

The close proximity of the proposed Fox 5 and 6 Military Operating Areas (MOA) to Anchorage Terminal Radar Approach Control's (A11) airspace will require new or modified transfer procedures between Anchorage ARTCC (ZAN) and A11. Being only 10.5NM north of A11's airspace, the proposed airspace may lead to some impact or changes for the military flyers in regards to recovery routes, airspace delays, and/or entry and exit fix modifications.

A further analysis will be required to determine the exact impacts of the JPARC Proposal. If you have any questions, please contact myself at 907-271-2701, Don Schrader (Fairbanks) 907-474-0050, or David Chilson (Anchorage) at 271-2710.

U.S. Department
of Transportation
**Federal Aviation
Administration**

MAR 1 0 2011

Kathleen I. Ferguson, P.E.
Deputy Assistant Secretary of the Air Force (Installations)
SAF/IEI
1665 Air Force Pentagon
Washington, DC 20330-1665

Dear Ms. Ferguson:

Thank you for your letter requesting the Federal Aviation Administration participate as a cooperating agency in the environmental impact statement (EIS) for the proposed Joint Pacific Alaska Range Complex (JPARC).

The FAA is pleased to participate in the EIS process in accordance with the National Environmental Policy Act of 1969 as amended, and its implementing regulations. Since the proposal involves special use airspace (SUA), the FAA will cooperate following the guidelines described in the Memorandum of Understanding between the FAA and the Department of Defense Concerning SUA Environmental Actions, dated October 4, 2005.

Modification of the SUA resides under the jurisdiction of the Western Service Center, Operations Support Group, Renton, WA. The Western Service Center will be the primary focal point for matters related to both airspace and environmental matters. Mr. John Warner is the Manager of the Operations Support Group. FAA Order 7400.2, Chapter 32 indicates the airspace and environmental processes should be conducted in tandem as much as possible; however, they are separate processes. Approval of either the aeronautical process or the environmental process does not automatically indicate approval of the entire proposal. I have enclosed Appendix 2, 3, and 4 of FAA Order 7400.2 for additional details.

A copy of the incoming correspondence and this response is being forwarded to Mr. Warner of the Western Service Center, Operations Support Group. Mr. Warner can be contacted at (425) 203-4500 for further processing of your proposal.

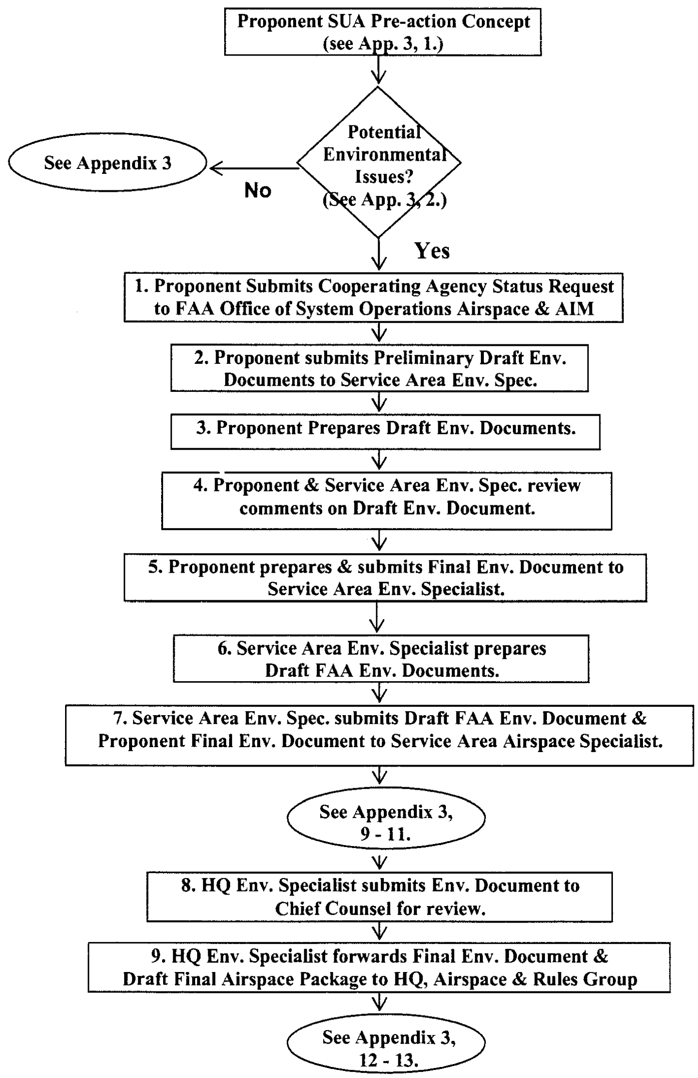
Sincerely,

Dennis E. Roberts
Director, Airspace Services
Air Traffic Organization

3 Enclosures

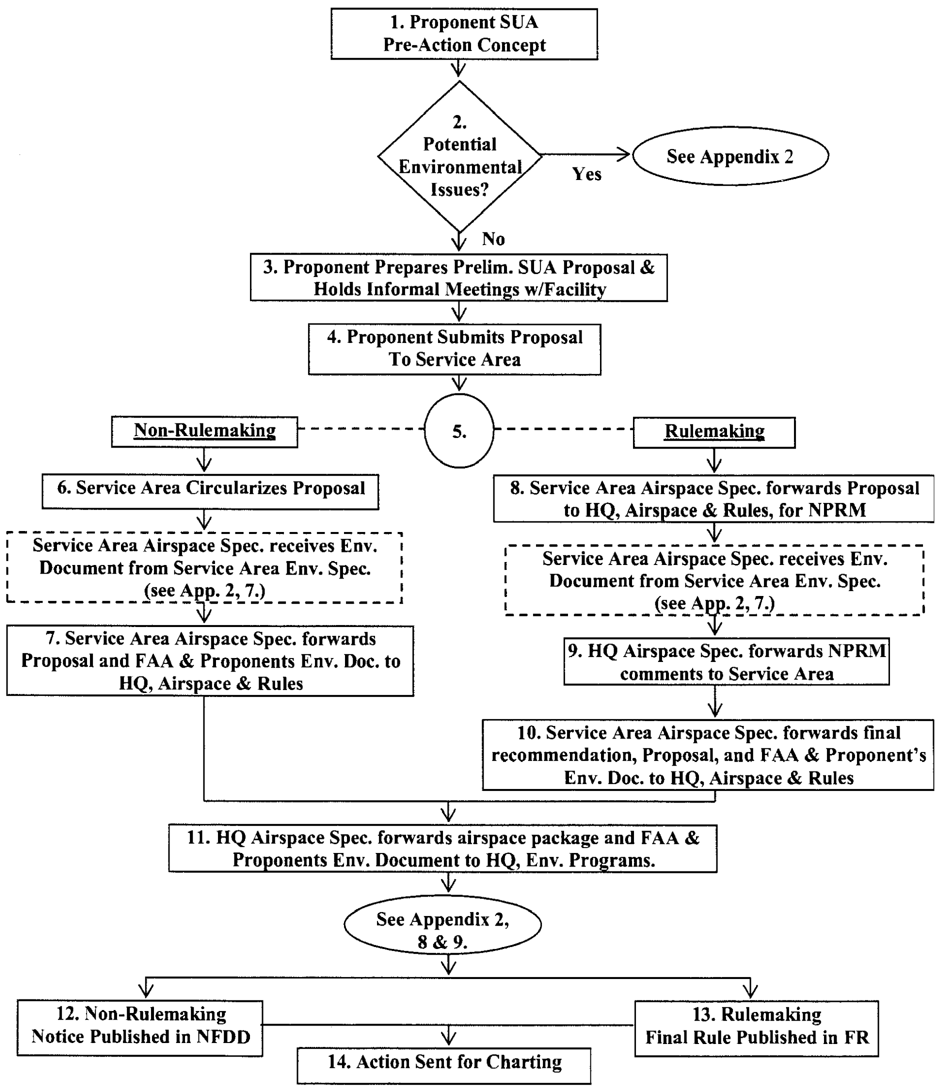
Appendix 2. Procedures For Processing SUA Actions Environmental Process Flow Chart

(This Chart is for use with Appendix 4 and the numbers correlate to the numbers in the Environmental column of that table.)



Appendix 3. Procedures For Processing SUA Actions Aeronautical Process Flow Chart

(This Appendix is for use with Appendix 4 and the numbers correlate to the numbers in the Aeronautical column of that table.)



Appendix 4. FAA Procedures for Processing SUA Actions Aeronautical and Environmental Summary Table

(The aeronautical and environmental processes may not always occur in parallel.)
(This Appendix is for use with Appendix 2 and Appendix 3, and the numbers correlate to numbers on those charts.)

(See note below.)

AERONAUTICAL	ENVIRONMENTAL
1. Proponent shall present to the Facility a Pre-draft concept (i.e., new/ revisions to SUA needed or required).	1. Proponent shall discuss with the Service Area, at the earliest time, the potential for environmental impacts associated with the proposal.
	2. If there is the potential for environmental impacts, Proponent shall make a request to the FAA for a Cooperating Agency (CA) status when Proponent decides to initiate the environmental process. Proponent shall forward the request to the Director of the System Operations Airspace and AIM. The Director will transmit the request to the Environmental Programs Group who prepares and forwards the response to Proponent. The Environmental Programs Group will send a courtesy copy of the response to the responsible Service Area. The Service Area environmental specialist works as the FAA point of contact throughout the process in development of any required environmental documentation.
	3. Proponent submits a Preliminary Draft EA or EIS to the Service Area environmental specialist. The Service Area environmental specialist shall provide comments, in consultation with the airspace specialist and the Environmental Programs Group, back to Proponent.

2. Proponent forwards the aeronautical proposal to the FAA Service Area for review and processing by the airspace specialist.	4. Proponent prepares a Draft EA or EIS with a 45-day public comment period. As the FAA CA point of contact, the Service Area environmental specialist reviews the associated draft environmental documentation to ensure that the Proponent addressed adequately all environmental concerns submitted on the Preliminary Draft. If required, the Service Area environmental specialist forwards the draft environmental documentation to the Environmental Programs Group for review and comment by the headquarters environmental specialist and the Office of Chief Counsel.
3. The Service Area airspace specialist, in accordance with this order, determines the type of airspace action(s) necessary, either Non-Rulemaking or Rulemaking. FAA Service Area and Proponent determine if informal Airspace Meetings are required.	
For Non-Rulemaking:	
4. The Service Area airspace specialist sends out a circularization with a 45-day public comment period. The Service Area air-space specialist reviews and prepares, in consultation with the Proponent, responses to the aeronautical comments from the study and circularization in accordance with Chapter 21 of this order.	5. The Proponent reviews comments received on their Draft EA/FONSI or EIS and prepares their responses to the comments, in consultation with the FAA and other cooperating agencies, if necessary, and in accordance with Chapter 32 of this order.
	6. Proponent prepares and submits their Final EA/FONSI or EIS/ROD to the Service Area environmental specialist.
	7. The Service Area environmental specialist prepares a Draft FAA FONSI/ROD or Draft FAA Adoption Document/ROD.
	8. The Service Area environmental specialist submits the Draft FAA FONSI/ROD or Draft FAA Adoption Document/ROD and the Proponent's Final EA/FONSI or EIS/ ROD to the Service Area airspace specialist for inclusion with the airspace proposal package.
5. The Service Area airspace specialist then sends the completed package containing the aeronautical proposal, response to comments, Proponent's Final EA/FONSI, and the Draft FAA FONSI/ROD to the Headquarters Airspace and Rules Group with their recommendation.	

4/10/08 JO 7400.2G

For Rulemaking:	
6. The Service Area airspace specialist sends the proposal to the Airspace and Rules Group who prepares a Notice of Proposed Rulemaking (NPRM). The Headquarters Airspace and Rules Group submits the NPRM for publication in the Federal Register with a 45-day comment period in accordance with Chapter 2 of this order.	
7. The Headquarters airspace specialist sends comments received on the NPRM to the Service Area airspace specialist for resolution.	
8. The Service Area airspace specialist then sends the completed package containing the response to comments, final service area recommendation, the proposal, Proponent's Final EA/FONSI or EIS/ROD, and the Draft FAA FONSI/ROD or Draft FAA Adoption Document/ROD to the Headquarters Airspace and Rules Group for preparation of the Final Rule.	
9. The Headquarters airspace specialist forwards the draft final rule package or draft non-rulemaking case summary (NRCS) with all supporting documentation to the Headquarters Environmental Programs Group for review (after all aeronautical comments have been resolved).	9. The Headquarters environmental specialist reviews the package for environmental technical accuracy; then submits the environmental documentation to the Office of the Chief Counsel, Airports and Environmental Law Division, for legal sufficiency review (having collaborated throughout the process).
	10. The Chief Counsel's environmental attorney's comments are incorporated into the final FAA environmental decision and signed by Headquarters Environmental Programs Group Manager. The package is then returned to the Headquarters Airspace and Rules Group.
10. For Non-rulemaking: The non-rulemaking action is published in the National Flight Data Digest. 11. For Rulemaking: The Final Rule is published in the Federal Register. The Final Rule will contain a reference to the decision rendered and location of documentation for the associated environmental process.	

FAA Procedures for Processing SUA Actions Aeronautical and Environmental Summary Table Appendix 4-3

Consult the following documents throughout the process for further information:

- Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (NEPA), 40 CFR Parts 1500-1508
- FAA Order 1050.1E, "Environmental Impacts: Policies and Procedures"
- FAA Order 7400.2, "Procedures for Handling Airspace Matters," Part 5
- FAA Order 7400.2, Chapter 32, "Environmental Matters" and the associated appendixes (for specific SUA environmental direction)

NOTE: The time periods below are for a non-controversial aeronautical proposal and its associated environmental process. The time periods are for FAA review/processing only. Times for proponent and/or environmental contract support processing must be added.

ENVIRONMENTAL: The estimated time of completion for EA processing is 12 to 18 months or, for EIS processing, 18 to 36 months.

AERONAUTICAL (Non-Rulemaking): A minimum 4 months is required from submission of the Formal Airspace Proposal by the Proponent to the Service Area through completion of the circularization process. Additionally, a minimum of 6 months is required from submission of the Formal Airspace Proposal by the Service Area to Headquarters through completion of the charting process.

AERONAUTICAL (Rulemaking): A minimum 6 weeks for Service Area processing, and a minimum of 9 months to complete rulemaking once the formal package is received at Headquarters.

Federal Aviation Administration

Memorandum

Date: MAR 11 2011

To: Lori Andriesen, Program Manager, AJV-W21

From: Bob W. Bob Watkins, Air Traffic Manager, Anchorage ARTCC

Subject: Comments for the future Joint Pacific Alaska Range Complex (JPARC) Expansion

Attached are comments for the proposed JPARC Environmental Impact Statement (EIS).

If you have any questions regarding this information, please contact Mark Edge, Military Operations Specialist, ZAN-530.ME at (907) 269-1121.

ANCHORAGE ARTCC (ZAN)
INITIAL COMMENTS FOR THE
JOINT PACIFIC ALASKA RANGE COMPLEX (JPARC) PROPOSED
ENVIROMENTAL IMPACT STATEMENT

The following are initial comments for the future JPARC EXPANSION EIS based on the information provided to Anchorage ARTCC and in accordance with FAA JO7400.2, paragraph 21-4-3.

1. Proposed Fox 3 Military Operating Area (MOA) Expansion and New Paxon MOA:

a. Fox 3 MOA: No comment at this time.

b. Fox 4 MOA: No comment at this time.

c. Fox 5 and 6 MOA: The lateral boundaries of Fox 5/6 MOAs extend too far south and west, therefore, do not allow the following:

(1) Sequencing of northbound Anchorage departures en route to the Fairbanks area. Typically, northbound traffic requires sequencing to the east of V438 and J115. The sequencing to the west of these airways would be unadvisable and also be a possible safety risk as all aircraft southbound to the Anchorage Terminal Area are sequenced between Talkeetna, Alaska and Anchorage, Alaska.

(2) Sequencing of arrivals and departures between the Anchorage Airport and Gulkana, Alaska. With the current Fox 5 MOA information given to ZAN and the boundaries of Anchorage TRACON, there is very little room for vectoring aircraft left or right of course.

d. Paxon MOA: With the information provided, the establishment of a Paxon MOA would close 3 low altitude airways (V481, V515, and V444). The outcome of closing these airways would be as follows:

(1) Small or low flying aircraft would be forced to either proceed from Gulkana/Northway, Alaska to Delta Junction/Fairbanks, Alaska VFR. As most of this airspace is requested in conjunction with adjacent pieces of airspace, circumnavigation of the airspace is unlikely. Terrain in this area is very high and could preclude a small aircraft from flying around this airspace VFR.

(2) The lack of low altitude radar and frequency coverage may eliminate the ability for small or low flying aircraft to proceed to the previously stated airports on anything other than established airways.

2. Proposed Realistic Live Ordinance Delivery:
No comment at this time.

3. Proposed Joint Combined Arms Live Fire:
With the information provided, the establishment of the BAX Restricted Area would close 3 low altitude airways (V481, V515, and V444). The outcome of closing these airways would be the same as previously stated under the Paxon MOA.

4. Proposed Night Joint Training:
No comment at this time.

5. Proposed Remotely Piloted Aircraft (RPA)/Unmanned Aerial Vehicle (UAV) Access:
No comment at this time.

6. Proposed Enhanced Access to Ground Maneuver Space:
No comment at this time.

7. Proposed Joint Air – Ground Integration Complex:
No comment at this time.

8. Proposed Intermediate Staging Bases:
No comment at this time.

9. Proposed Missile Live Fire for AIM – 9X and AIM – 120 in the Gulf of Alaska:
No comment at this time.

10. Proposed Joint Precision Airdrop System Drop Zones:
No comment at this time.

L.2 GOVERNMENT-TO-GOVERNMENT CONSULTATION

L.2.1 Government-to-Government Consultation Follow-up Letter and Minutes

HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

APR 8 2011

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
JBER AK 99506

Mr. Eric Olsen
Council Member, Sun'aq Tribe of Kodiak
312 West Marine Way
Kodiak, AK 99615

Dear Mr. Olsen

Thank you for joining me and Brigadier General Palumbo on 28 February 2011 for formal government-to-government consultation regarding our proposed enhancements to the Joint Pacific Alaska Range Complex (JPARC). We were honored by the respect and integrity you and the other tribal leaders exhibited during your visit. We hope you gained a better understanding of our proposals. We have enclosed minutes to accurately reflect our discussion and agreements. We have a much better understanding of your concerns now and are pleased we came to some agreements to address them. I always learn so much whenever I meet with tribal leaders and appreciate your participation.

If you require any other information on JPARC or the consultation, please contact my Native Affairs and Natural Resources Advisor, Dr. Jerome Montague at (907) 552-2769 or jerome.montague@elmendorf.af.mil. You can also track JPARC developments and find more detailed information on our website www.jparceis.com.

Sincerely

Dana T. Atkins
DANA T. ATKINS
Lieutenant General, USAF
Commander

Enclosure: Minutes of Consultation

cc: MG Palumbo

Guardian of the North

HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

APR 8 2011

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
JBER AK 99506

Mr. William Miller
President, Dot Lake Tribal Council
P.O. Box 2279
Dot Lake AK 99737

Dear Mr. Miller

Thank you for joining me and Brigadier General Palumbo on 28 February 2011 for formal government-to-government consultation regarding our proposed enhancements to the Joint Pacific Alaska Range Complex (JPARC). We were honored by the respect and integrity you and the other tribal leaders exhibited during your visit. We hope you gained a better understanding of our proposals. We have enclosed minutes to accurately reflect our discussion and agreements. We have a much better understanding of your concerns now and are pleased we came to some agreements to address them. I always learn so much whenever I meet with tribal leaders and appreciate your participation.

If you require any other information on JPARC or the consultation, please contact my Native Affairs and Natural Resources Advisor, Dr. Jerome Montague at (907) 552-2769 or jerome.montague@elmendorf.af.mil. You can also track JPARC developments and find more detailed information on our website www.jparceis.com.

Sincerely

Dana T. Atkins

DANA T. ATKINS
Lieutenant General, USAF
Commander

Enclosure: Minutes of Consultation

cc: MG Palumbo

Guardian of the North

HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON ALASKA

APR 8 2011

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
JBER AK 99506

Mr. Doug Wade, Chairman
Chickaloon Village
P.O. Box 1105
Chickaloon AK 99674

Dear Mr. Wade

Thank you for joining me and Brigadier General Palumbo on 28 February 2011 for formal government-to-government consultation regarding our proposed enhancements to the Joint Pacific Alaska Range Complex (JPARC). We were honored by the respect and integrity you and the other tribal leaders exhibited during your visit. We hope you gained a better understanding of our proposals. We have enclosed minutes to accurately reflect our discussion and agreements. We have a much better understanding of your concerns now and are pleased we came to some agreements to address them. I always learn so much whenever I meet with tribal leaders and appreciate your participation.

If you require any other information on JPARC or the consultation, please contact my Native Affairs and Natural Resources Advisor, Dr. Jerome Montague at (907) 552-2769 or Jerome.Montague@elmendorf.af.mil. You can also track JPARC developments and find more detailed information on our website www.jparceis.com.

Sincerely

Dana T. Atkins
DANA T. ATKINS
Lieutenant General, USAF
Commander

Enclosure: Minutes of Consultation

cc: MG Palumbo

Guardian of the North

HEADQUARTERS ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

Minutes of Government-to-Government Consultation Between Alaskan Command and Chickaloon Village, Dot Lake Tribal Council and Sun'aq Tribe of Kodiak Concerning Proposed Enhancements to Joint Pacific Alaska Range Complex, 28 February 2011, Joint Base Elmendorf-Richardson, Alaska

Agenda

10:00 AM	Tour of Joint Operations Center (Mr. Jurewicz)
10:30	Tour of F-22, AIM-9 and AIM-120 missiles display (Lt Col Davis)
11:30	Tour of 212th Rescue Squadron (SMSgt Nelson)
12:30PM	Welcome and introductions (Lt Gen Atkins) (working lunch at Arctic Warrior Event Center-Billy Mitchell room)
12:40	Prayer (Mr. Olsen)
12:45	Command Video
1:25	Summary of the agency's consultation policy outlining rights and responsibilities (Dr. Montague)
1:45	Break
1:55	Summary of proposed missile firing in Gulf of Alaska (Maj Cabral)
2:15	Summary of activities in proposed Paxon Military Operating Area (MOA) (Maj Cabral)
2:35	Summary of activities in proposed Fox 5 MOA (Maj Cabral)
2:55	Break
3:00	Consultation (Lt Gen Atkins, Mr. Miller, Mr Olsen, BG Palumbo, and Mr. Wade)
4:00	Adjourn

Guardian of the North

Attendees

Mr. Gene Agnew, Chickaloon Village, Transportation Department
Lt Gen Dana Atkins, Commander, Alaskan Command (ALCOM)
COL Thomas Bell, Deputy Director, Joint Exercise and Training Directorate, ALCOM
Maj Michael Cabral, Chief, Joint Exercise Division, ALCOM
Mr. Jeff Fee, Director, Joint Exercise and Training Directorate, ALCOM
Mr. William Miller, President, Dot Lake Tribal Council
Dr. Jerome Montague, Native Affairs and Natural Resources Advisor, ALCOM
Mr. Eric Olsen, Council Member, Sun'aq Tribe of Kodiak
BG (P) Raymond Palumbo, Deputy Commander, ALCOM
MAJ Russell Price, Deputy Director, Logistics and Engineering, ALCOM
Mr. Rickhart Rowland, Natural Resources Director, Sun'aq Tribe of Kodiak
Ms. Joan Smart, Community Relations Specialist, ALCOM
Mr. Doug Wade, Chairman, Chickaloon Village

Discussion

Dot Lake: Dot Lake indicated there has been supersonic low-level over flights even within the 4000' AGL restricted area around his village. The most disturbing over flights are low level, fast and/or with sonic booms. Low and slow is not really too bothersome. In the past Army personnel caused the most trouble. Once off-duty officers landed a helicopter on a lake near the tribe to go ice fishing. Their main concerns are not disturbing the non-migrating caribou during the calving season on the Macomb Plateau and not disturbing the moose during the two-week hunting season in the fall. The tribe indicated they were grateful for ALCOM's distinct recognition of tribal sovereignty and the opportunity to consult one-on-one with the commanders. In previous consultation with the military, tribal members suggested that the DoD will only listen to their concerns and not do anything about them. Their experience after consultation over military training routes in 2004 was the Air Force really did re-route MTRs away from their village.

ALCOM replied that non-Alaskan pilots are sometimes less familiar with the airspace and make mistakes. If we find out about it, we retrain the pilots to ensure future compliance with the rules. Now our planes have displays which show exactly where they are. Further, air traffic controllers are also now helping pilots stay within their bounds. Using military planes for recreation is a violation of federal law.

Chickaloon: Chickaloon asked how our radio frequency jamming exercises affect civilian use. The tribe discussed how there were many violations of game laws by Service members many years ago such as shooting caribou and moose with non-expanding full metal jacket bullets that do not kill cleanly. These occurrences still leave a bad taste in their mouth and even recently some Soldiers shot two swans and other animals out of season. The tribe asked the military to oppose development near them. Their main environmental concerns were protection of Dall sheep lambing and caribou calving areas near them from disturbance by aircraft. The tribe indicated some other tribes did not consult but had concerns.

ALCOM indicated the Air Force cannot jam or interfere with civilian frequencies. Service members committing crimes outside military areas may be prosecuted by civilian or military

authorities. The military is the benchmark in the nation for race relations and controlling drug abuse. The military now has no conscripts and is better educated, with over one quarter of enlisted members having bachelor's degrees. This is a very different atmosphere than you might have experienced in the '60s and '70s. A few of the tribes who were offered to consult for JPARC did not wish to consult but none-the-less had some concerns. These concerns are attached and will be considered in any final proposal.

Sun'aq: Sun'aq had many concerns over training activities in the Gulf of Alaska (GOA) both with the Navy's GOA Environmental Impact Statement (EIS) and what was proposed with the JPARC EIS. Their concerns centered around effects of military training (from explosions, sonar and contaminants) on salmon and marine mammals while at sea before they get near their subsistence areas. They further indicated salmon are badly disturbed even from the shadow of aircraft flying over. They wondered if the training area could be moved further offshore or moved from place to place. How do you protect marine life from non-exploding missiles? They outlined how the Kodiak missile launch facility was initially sold to the public for one use but has now expanded into many different uses than was originally proposed. Will you do this with JPARC? Also will you use local knowledge when developing and implementing your proposal? This tribe also indicated they were grateful for ALCOM's distinct recognition of tribal sovereignty and the opportunity to consult one-on-one with the commanders.

ALCOM reminded all that this consultation was only for Air Force activities in the GOA (100 non-exploding air-to-air missile firings annually) and that the consultation and public comment period was over on the Navy's proposed activities in the GOA (these began in 2007). Our missiles are non-exploding and the rocket motors burn out in 17 seconds, usually before impact with the water. Therefore, the amount of contaminants resulting is miniscule. Further, most air-to-air missiles are fired mid-altitude (20,000 feet). No aircraft will be casting a dark shadow on marine life. The over water training areas cannot be moved further offshore due to the fact that these areas must be near enough to bases so that fuel costs would not be prohibitive. The training areas cannot be moved around because an EIS needs to be prepared for every training area and that is cost prohibitive. ALCOM understood the "bait and switch" concern expressed during the comparison with the Kodiak Launch facility. This was not a directly applicable comparison since the launch facility was a private enterprise and JPARC was the Department of Defense (DoD). Nonetheless, the tribes would be protected from this in that any new proposal would require new government-to-government consultation and a new EIS. Lastly, ALCOM indicated it would be foolish to not use and benefit from the local knowledge.

Consultation Agreements

ALCOM:

Agreed to extend existing flight restrictions along the Alaska Highway further east on the highway near the north boundary of the proposed Paxon MOA.

Agreed to develop flight restrictions during the caribou calving season over the Macomb Plateau.

Agreed to consider some flight restrictions during the 2-week fall moose hunting season.

Agreed to provide Chickaloon Village with the decibel level of a supersonic F-22 at 5000' AGL.

3

Agreed to consider some flight restrictions during caribou calving and Dall sheep lambing periods near Chickaloon.

Agreed to allow the three tribes to contact COMALCOM directly if the tribe felt it necessary.

Agreed to allow the three tribes to re-initiate consultation if, after JPARC enhancement is implemented, the tribe(s) observe negative effects on wildlife.

Chickaloon:

Agreed that while they were opposed to any development near them, the JPARC enhancements seemed minimally invasive and is progress they will not fight pending evaluation after it is implemented.

Dot Lake:

Agreed the proposed flight restrictions addressed their concerns.

Sun'aq:

Agreed that although the tribal council opposed this proposal, after what was learned during the consultation, they have no concerns with the JPARC proposal but continue to have reservations about Navy activities.

The Tribe With Concerns But Did Not Seek Government-to-Government Consultation with Alaskan Command Concerning Proposed JPARC Enhancements:

Cheesh-na Tribal Council: This tribe indicated the proposed area was not close enough to them to cause direct concerns but they would like us to consider avoiding low-level flights over swan nesting areas and avoiding low-level flights over waterfowl concentrations anywhere. There are 1-3 jet flights up the Copper River each year, and they do not like it. They also do not like the Nabesna Road.

L.2.2 Initial Alaska Native Government-to-Government Consultation Letter with Enclosure and Mailing List

ALASKA NATIVE GOVERNMENT-TO-GOVERNMENT CONSULTATION LETTER WITH ENCLOSURE AND MAILING LIST

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

Lieutenant General Dana T. Atkins
Commander, Alaskan Command
9480 Pease Ave., Suite 110
JBER AK 99506-2101

Ms. Veronica Nicholas, President
(or current President)
Native Village of Cantwell
P.O. Box 94
Cantwell AK 99729

Dear Ms. Nicholas

The Department of Defense is proposing to reconfigure existing Alaska military airspace and training land to meet current and future training requirements. This reconfiguration, named Joint Pacific Alaska Range Complex (JPARC), will create a world class air, land, sea and computer simulated joint military training range. New, advanced, technologies, smarter opponents and tougher warfare terrain have brought about dramatic change in our training needs. JPARC would provide active-duty, National Guard and reserve components of the Army, Navy, Marine Corps, Air Force, Coast Guard and Special Operations military units the opportunity to train together (enclosure 1). Joint, realistic combat training is essential to the success of today's military operations and requires a location to accommodate air, ground, space, and maritime training operations. Currently the Army, Navy and Air Force base and train their units at Alaska installations, taking advantage of existing live-fire training ranges, special use airspace, restricted airspace, transit corridors and maritime environments. JPARC would combine the capabilities of these existing installations into a single training complex unmatched in the world.

Pursuant to our American Indian/Alaska Native Policy and Implementation Guidance (enclosure 2), I ask you to consider whether this proposal may have the potential to significantly affect any of the Cantwell Tribe's tribal rights, Indian land or protected tribal resources. Since this proposal is complex we have scheduled 60 days for your review hence I would appreciate a reply by November 8, 2010, with your

analysis. If you think your tribe will be affected, please specify which tribal right(s) or protected tribal resource(s) will be affected and how it (they) will be significantly affected. If you reply by indicating an effect to a right, resource or Indian land, we invite you to consult with us on a Government-to-Government basis as a way to discuss issues before we move forward with further environmental analysis and public comment. Additional information on this project can be found by visiting www.jparceis.com. We look forward to working with you to address any concerns you have on this project. Also, please let us know if you think tribes other than those listed in enclosure 3 may have concerns with JPARC. Please contact my Native Affairs Advisor, Dr. Jerome Montague, at Jerome.montague@elmendorf.af.mil or (907) 552-2769 if you have any questions.

Sincerely

DANA T. ATKINS
Lieutenant General, USAF
Commander

3 Enclosures:

1. JPARC Proposed Activities and Maps
2. DoD American Indian/Alaska Native Policy and Alaska Implementation Guidance
3. JPARC Tribal Consultation Address list

PURPOSE AND NEED FOR THE PROPOSED *JOINT PACIFIC ALASKA RANGE COMPLEX ENVIRONMENTAL IMPACT STATEMENT* ACTIONS

The U.S. Department of Defense (DoD) faces an exceptional challenge to meet compelling and increasingly urgent warfighter needs. In an era of persistent combat operations, the DoD continues to generate new technologies, learn from battlefield experiences, update tactics, and train intensively. Each of these challenges drives the need for continued development and enhancements to the range and airspace infrastructure to more accurately replicate the modern battlefield for training and testing. With the planned continued development and enhancements, the Joint Pacific Alaska Range Complex (JPARC) would provide the critical future training and testing required in a manner that maximizes modern battlespace realism.

1.1 Background to the JPARC

Studies by the U.S. Joint Forces Command and others predict that U.S. military combat operations will require response to a blend of conventional and irregular threats from peer or near-peer potential adversaries. Adding to the challenge, the physical conditions in the regions of potential conflict are characterized by harsh climates. Joint forces and joint training are key strategy elements in responding to theses threats.

Currently, Alaska's military assets use extensive air, land, and sea areas to replicate realistic conditions for relevant combat training and testing of combat systems. However, expanded weapons and sensor capabilities, expanded mobility, and improved communications have all driven the need for larger operational footprints. Ranges and airspace used for training must respond as technology continues to expand the military footprint, and as combat operations continue as complex, full-spectrum, blended engagements that call for agile joint forces to deploy into complex terrain.

Our forces must always be ready to operate immediately as a joint team in all domains—land, sea, air, maritime, and information. The JPARC would provide a training venue with the land, water, and airspace for joint Services home training. Alaska provides a unique backdrop with an uncluttered electromagnetic environment, minimal encroachment, and a strategic location within the sovereign bounds of the United States.

The expanse and availability of the ranges and airspace would allow commanders to train for full-spectrum engagements from individual skills up to tactical and operational joint tasks. The vision for the JPARC builds on these inherent strengths and drives continued tactical relevance to the evolving operational conditions, latest technology, and mission priorities that require joint training approaches.

Developing the JPARC would build on a firm foundation of extensive training, decades of testing, and range infrastructure already in place. Future investments would come from the individual Services—Army, Air Force, and Navy—that would jointly benefit from these capabilities. In recognition of the value of collaboration among JPARC Stakeholders, the U.S. Pacific Command (USPACOM) directed the creation of the Alaska Joint Training Program of Excellence, with the JPARC as its centerpiece.

1.2 Proposed JPARC Actions and Alternatives

The following projects are those currently proposed to be addressed in the *Joint Pacific Alaska Range Complex Environmental Impact Statement (JPARC EIS)*. The proposed JPARC would create improved training and testing opportunities through continued development and enhancement of Alaska's current training areas and capabilities. The military Services jointly propose to enhance and/or establish new Military Operations Areas, Restricted Areas, airspace corridors, ground maneuver training areas, training facilities and supporting infrastructure to provide adequate airspace and controlled-access land to train under realistic and varied conditions.

1

The *JPARC EIS* will analyze the environmental effects of the proposed JPARC continued development and enhancements, including special use airspace expansion, land-based training/maneuver space expansion, road and airfield construction, facility construction and renovation, equipment storage and operation, onsite maintenance, live ordnance delivery, training with remotely piloted aircraft, extended night vision training, buffered drop zones, and the use of training airspace. The descriptions of the proposed JPARC actions are presented in the table below, *JPARC EIS* Proposed Actions and Alternatives and in Attachment A, JPARC Overview of EIS Proposed Actions and Alternatives. Attachments B through H more specifically identify the locations for the *JPARC EIS* Proposed Actions and Alternatives.

JPARC EIS **Proposed Actions and Alternatives**	**Map**
Fox 3 Military Operating Area (MOA) Expansion and New Paxon MOA **Proposed Action:** The Air Force proposes to expand the Fox 3 MOA and establish a new, adjacent Paxon MOA to provide the vertical and horizontal airspace structure needed to better accommodate low-altitude threat and multiple-axis mission activities during Joint Pacific Alaska Range Complex training exercises. **Key Components:** Expand the boundaries of the existing Fox 3 MOA, currently extending from 5,000 feet above ground level (AGL) up to, but not including flight level (FL) 180, to the south and east and subdivide it into four sectors, with the newly expanded sectors extending from 500 feet AGL up to, but not including, FL180. Establish a new Paxon MOA, extending from 500 feet AGL up to, but not including, FL180, to adjoin the proposed expanded Fox 3 MOA to the east. **Action Alternatives:** **Alternative A** includes the proposed expanded Fox 3 MOA and the proposed new Paxon MOA with both the high- and low-altitude MOAs. **Alternative B** includes only the Fox 3 MOA expansion (as in Alternative A) without the new Paxon MOA. **Alternative C** includes the Fox 3 MOA expansion without the low-altitude MOA. **Alternative D** proposes keeping the Fox 3 MOA boundaries the same as they currently exist, but separating the MOA into four subdivided sectors, as well as high- and low-altitude MOAs. The low-altitude MOA would extend from 500 feet AGL up to, but not including 5,000 feet AGL. The high-altitude MOA elevations would match those currently existing.	**Attachment B** Proposed Fox MOA Expansion

2

JPARC EIS Proposed Actions and Alternatives	Map
Realistic Live Ordnance Delivery **Proposed Action:** The proposed action is to establish a realistic air and ground training environment that would accommodate live ordnance delivery. **Key Components:** As the technology for new weapons systems continues to evolve, the ground footprint for ordnance delivery training continues to expand, thus creating the need for larger ground and airspace areas in which to safely conduct this training. The GBU-32 [Guided Bomb Unit-32] and Small-Diameter Bomb (SDB) have the largest footprints; therefore, they would serve as the basis for locating the targets and the airspace needed to fully support live ordnance delivery using these systems. Live ordnance activities would be executed as part of both individual pilot training and joint training with other air and ground units. **Action Alternatives:** **Alternative A** proposes the use of existing targets in the Oklahoma Impact Area within Restricted Airspace 2202 (R-2202) with the expansion of this restricted airspace to the west to encompass the airspace and underlying lands. **Alternative B** proposes that live ordnance delivery make use of existing targets at the Oklahoma and Blair Lakes Impact Areas with new restricted airspace established that links R-2211 and R-2202. Based on the ceiling altitude of R-2211 as flight level (FL) 310 and the upper altitude of R-2202 being FL310, the proposed altitude for the restricted airspace linking these two restricted areas would also be FL310. Higher altitudes may be required for some live-fire ordnance profiles. **Alternative C** proposes weapons corridors through the Eielson Military Operations Area and overlying Air Traffic Control Assigned Airspace that would provide two protective pathways for live ordnance use within the Oklahoma Impact Area. These corridors would be approximately 10 miles in width and extend from FL200 to FL310, as needed, to accommodate the delivery altitudes of the ordnance types being delivered.	**Realistic Live Ordnance Delivery Alternatives** Attachment C: Alternative A Proposed R-2202 Expansion Attachment D: Alternative B Proposed Restricted Area Linking R-2211 and R-2202 Attachment E: Alternative C Proposed Eielson Weapons Corridors
Joint Combined Arms Live Fire (JCALF) **Proposed Action:** The Army proposes to establish restricted airspace (RA) to better support JCALF training over the Battle Area Complex (BAX) located in the Donnelly Training Area (DTA) near Delta Junction, and the Digital Multipurpose Training Range (DMPTR), located in the Yukon Training Area (YTA). **Key Components:** JCALF is a critical component to Army training because this exercise activity involves multiple combat functions operating together to accomplish the same mission objectives. For example, armed reconnaissance helicopters, such as OH-58Ds, and ground forces practice maneuvering together against the same objectives. In addition, Air Force A-10s could provide support during the JCALF training exercises. This type of joint training is a critical step between individual and small unit training and operating within a joint team structure with the Air Force, Navy, and Marines. This training proposes to integrate Army operations, including indirect fire, small arms, and Stryker vehicles, and Army aviation, including helicopters and remotely piloted aircraft. **Action Alternatives:** **Alternative A/BAX** establishes new RA directly over the BAX in the DTA currently proposed to support controlled firing areas. **Alternative A/DMPTR** establishes new RA directly over the DMPTR area located within YTA. This RA would provide protective areas for the hazardous activities and weapons safety footprints and would be of sufficient size to encompass hazardous activities and weapons footprints for the types of ordnance used in this area.	**Attachment F** Additional Proposed Airspace Changes

3

Night Joint Training **Proposed Action:** In combat situations, conducting flight training during the hours of limited visibility using advanced night vision technology gives the U.S. military a distinct advantage. Training with this equipment can only be conducted at night. **Key Components:** Extend the special use airspace (SUA) hours until 11:00 P.M., with landing by midnight, local time, during the months of March and October to accommodate flight training at night for major flying exercises (MFEs) and extend the Joint Pacific Alaska Range Complex (JPARC) operating hours for tactical flight operations. Coordinated Universal Time would be considered, which would provide the time-use stability by remaining on the sun clock in case daylight saving time is changed again. **Action Alternatives:** **Alternative A** proposes to extend the SUA hours to accommodate night training for MFEs during March and October. The hours are currently set to cease training activities by 10:00 P.M., with landing by 11:00 P.M., local time. **Alternative B** proposes to extend the JPARC operating hours to allow tactical flight operations until midnight and landing by 1:00 A.M., local time, during March and October. This would allow night training during these months from a minimum of 1.5 hours to a maximum of 2.5 hours for each exercise. **Alternative C** proposes to extend the JPARC operating hours to allow tactical flight operations until midnight and landing by 1:00 A.M., local time, during all months of the year and for all training purposes, not just for MFEs, as is the current situation.	**Attachment A** JPARC Overview of EIS Proposed Actions and Alternatives
Remotely Piloted Aircraft (RPA) Access **Proposed Action:** RPAs have emerged as a viable platform for reconnaissance and surveillance activities. RPA access throughout the Joint Pacific Alaska Range Complex (JPARC) ranges and airspace is critical to enhance JPARC training and exercises. *The following RPA corridors have been developed as individual, standalone proposed actions and alternatives:* Eielson Air Force Base (AFB) to Restricted Airspace 2211 (R-2211); Eielson AFB Class C airspace to R-2205; Allen Field to R-2202; R-2202 to R-2211; R-2205 to R-2202; Fort Wainwright to R-2211; and Fort Wainwright to R-2205. **Key Components:** Establish new restricted airspace (RA) or other suitable airspace, such as a Certificate of Authorization (COA), as determined by the Federal Aviation Administration, to support RPA airspace corridors. RPA activity would be intermittent, activating RAs or COAs only during training or exercises when RPAs are required. Each corridor would be between 5 and 8 nautical miles in width and of varying altitudes. **Action Alternatives:** **Alternative A** would establish new RA for each RPA corridor identified above. **Alternative B** would establish a RA via a COA for each RPA corridor identified above.	**Attachment F** Additional Proposed Airspace Changes

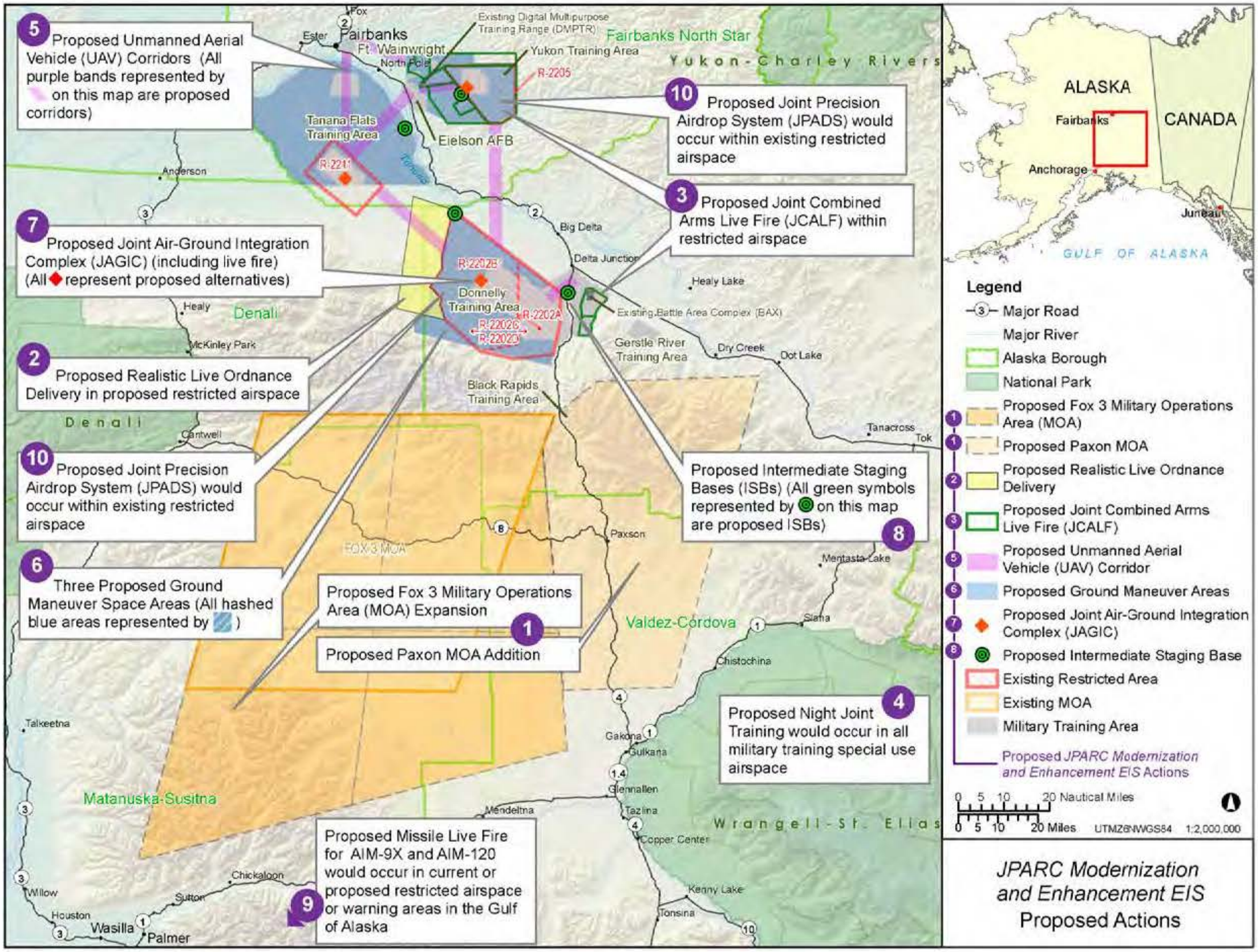
4

Maneuver Space	
Proposed Action: Provide expanded maneuver ground space and year-round accessibility in the Army's Tanana Flats (TFTA), Donnelly (DTA), and Yukon (YTA) Training Areas, as well as new roadway access in TFTA. **Key Components:** The expanded maneuver space would support year-round training access, internal circulation routes, and integration of proposed Intermediate Staging Bases. The training frequency at this time is planned to support six combat maneuver battalions training in these areas for a 10- to 14-day event at least once a year per battalion. The ground maneuver area could be used to train a Stryker company outside of the hazard footprints from aerial ordnance or indirect fire. The desired road surface would be a 35-foot-wide aggregate surface to allow two Stryker vehicles to pass. **Action Alternatives:** The only action alternatives developed to date involve proposed road access into the Blair Lakes area of TFTA, as shown on the corresponding map and described below. (Specific alternatives for direct access to DTA and YTA have not yet been developed to the point where a specific decision can be made.) **TFTA Access Road Alternative A** follows the proposed railroad alignment 11 miles, and then crosses the Tanana Flats along an existing winter-access trail to higher ground around Blair Lakes. **TFTA Access Road Alternative B** follows the proposed railroad alignment 8 miles before crossing the Tanana Flats toward Hill 1406. The route traverses the eastern slopes of Hill 1406, then a broad terrace southeast toward Blair Lakes, crossing Dry Creek near Blair Lakes. **TFTA Access Road Alternative C** follows existing trail systems southwest across the Tanana Flats toward Hill 1406, avoiding open areas as much as possible. From Hill 1406, two possible routes to Blair Lakes are being considered: the first traverses the eastern slopes of Hill 1406 and then a broad terrace southeast toward Blair Lakes, crossing Dry Creek near Blair Lakes; the second route remains on the flats north of Hill 1406, crossing Dry Creek where the creek enters the flats, then running up the Dry Creek Valley to the higher ground around Blair Lakes. **TFTA Access Road Alternative D** is similar to Alternative C, except it takes a more direct route from the Tanana River toward Hill 1406. From Hill 1406, two routes to Blair Lakes are being considered: the first traverses the eastern slopes of Hill 1406, then a broad terrace southeast toward Blair Lakes, crossing Dry Creek near Blair Lakes; the second route remains on the flats north of Hill 1406, crossing Dry Creek, and then running up the Dry Creek Valley to higher ground around Blair Lakes.	**Attachment G** **Additional Proposed Ground Changes**

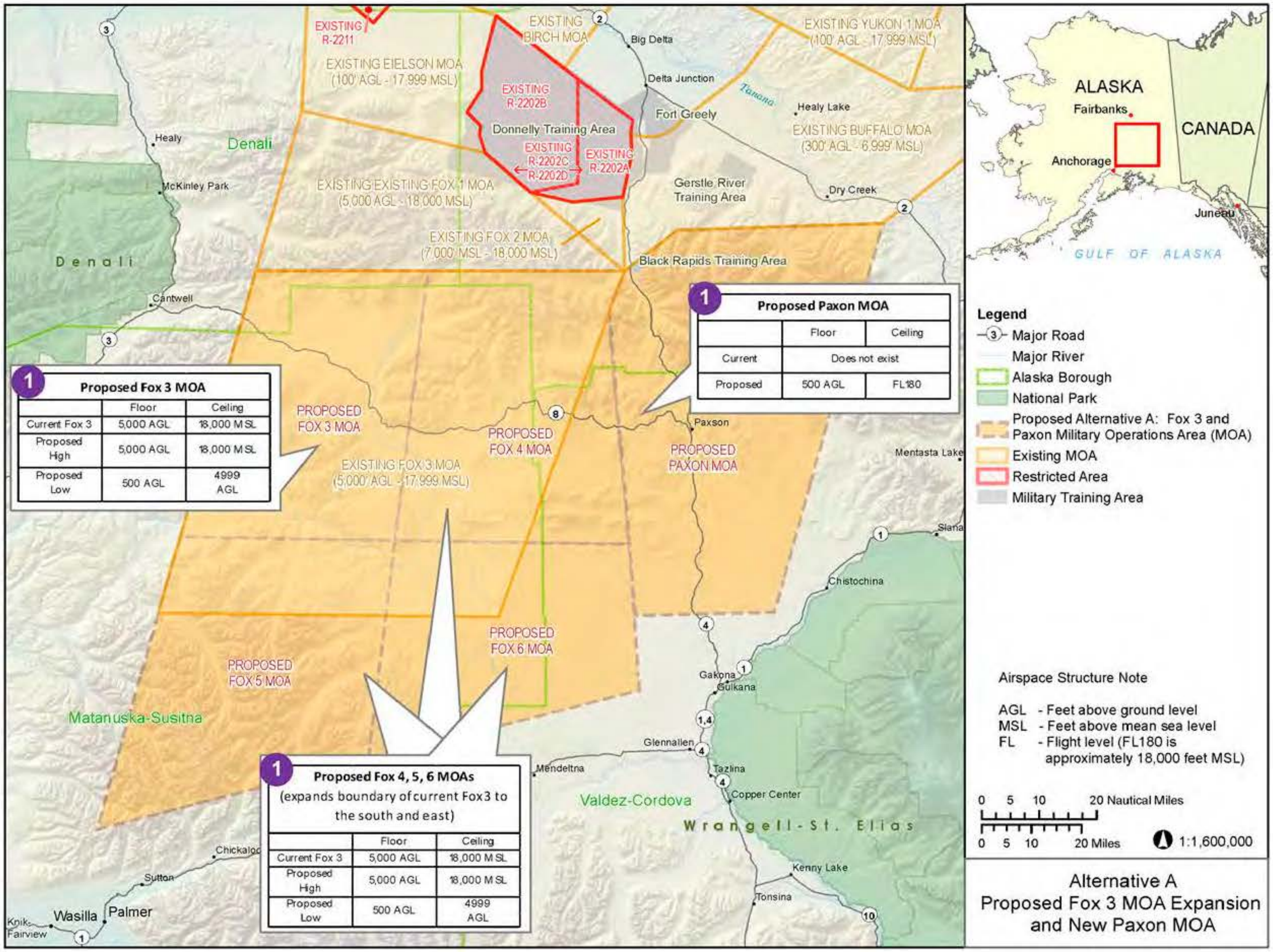
Joint Air-Ground Integration Complex (JAGIC) **Proposed Action:** The JAGIC is a proposed Joint Pacific Alaska Range Complex capability for joint and combined live training. The JAGIC would allow Army-combined arms capabilities to jointly operate with the Air Force and Navy air-to-air and air-to-ground capabilities along with special operations forces. **Key Components:** The JAGIC is a digitally integrated combat training area with a total footprint of approximately 912 by 128 km in size. The JAGIC would consist of target arrays with service roads, range support buildings, parking area, range tower, convoy live-fire route, urban centers, and an area for rocket training. Most of the target arrays, the convoy live-fire route, and the urban facilities would be concentrated in a 9- by 612-km area within the range. The JAGIC would be strategically placed to provide adequate airspace and controlled-access land for the safety buffers needed to train with a full range of munitions that may be used in combat. **Action Alternatives:** **Alternative A** proposes to locate the JAGIC in the central area of DTA-West, proximate to the western boundary of the Oklahoma Impact Area. **Alternative B** proposes to locate the JAGIC in the Stuart Creek Impact Area within YTA. **Alternative C** proposes to locate the JAGIC in the Blair Lakes Impact Area near the southern boundary of the Tanana Flats Training Area under the existing Restricted Airspace 2211 (R-2211).	**Attachment G** **Additional Proposed Ground Changes**
Intermediate Staging Bases (ISBs) **Proposed Action:** Locate and construct a 1,000-Soldier ISB near the existing Battle Area Complex (BAX), along with three 200- to 500-Soldier ISBs at Yukon Training Area (YTA), Donnelly Training Area-West (DTA-West), and Salcha. **Key Components:** The ISBs would include permanent barracks, large parking areas, dining facilities, ammunition storage points, petroleum-oil lubricant areas, maintenance facilities, and possible airfields to house, maintain, and stage soldiers before insertion into surrounding combat training areas. They would also provide maintenance and logistics support away from main cantonment areas. **Action Alternatives:** **Alternative A** is to provide a permanent 1,000-Soldier ISB near existing BAX, along with three permanent 200- to 500-Soldier ISBs at YTA, DTA-West, and Salcha. The facility would be for joint use, not Army use only. These are proposed at key points along the planned rail corridor close to the planned bridge crossings. **Alternative B** is to use existing temporary "relocatable" ISB facilities over the next 7 years, and then replace them with permanent facilities.	

Missile Live Fire for AIM-9X and AIM-120 **Proposed Action:** The AIM-9X and AIM-120 missile systems are the main air-to-air armaments for the F-22 Raptor. For effective training to be conducted with these systems, live training shots need to be executed as part of both individual pilot training and joint training exercises with other air and ground units, such as Northern Edge. **Key Components:** Live ordnance delivery requires use of either restricted airspace with range target areas or a warning area of sufficient size to contain the explosive hazard areas associated with these missile systems. Instrumentation would be needed to control drones, radar, radio relays, and weapon telemetry and termination equipment in support of this training activity. **Action Alternatives:** **Alternative A** proposes that the existing Temporary Maritime Activities Area (300 nautical miles [NM] long by 150 NM wide; 0 feet above ground level [AGL] – flight level (FL) 600; includes subsurface operating areas), and Warning Area 612 (WA-612) (0 feet AGL – FL290) in the Gulf of Alaska be considered for the missile live fire delivery of the AIM-9X and AIM-120 missiles by Air Force F-22 fighter aircraft.	**Attachment H** **Proposed Missile Live Fire for AIM-9X and AIM-120 in the Gulf of Alaska Temporary Maritime Activities Area and Warning Area 612**
Joint Precision Airdrop System (JPADS) Drop Zones **Proposed Action:** Provide JPADS drop zones as part of Joint Pacific Alaska Range Complex training exercises. **Key Components:** Utilize current or proposed restricted airspace to support JPADS drop zone training with a system of global positioning system receivers and steerable parachutes to support aerial resupply training under realistic and varied conditions. **Action Alternatives:** **Alternative A** proposes conducting reduced operations in Restricted Airspace 2205 (R-2205) in the Yukon Training Area. **Alternative B** proposes conducting reduced operations in the Donnelly Training area Oklahoma Impact Area. (The key distinction between Alternatives A and B is that Restricted Airspace 2205 currently has more time available to accommodate JPADS Drop Zone training exercises.)	**Attachment G** **Additional Proposed Ground Changes**

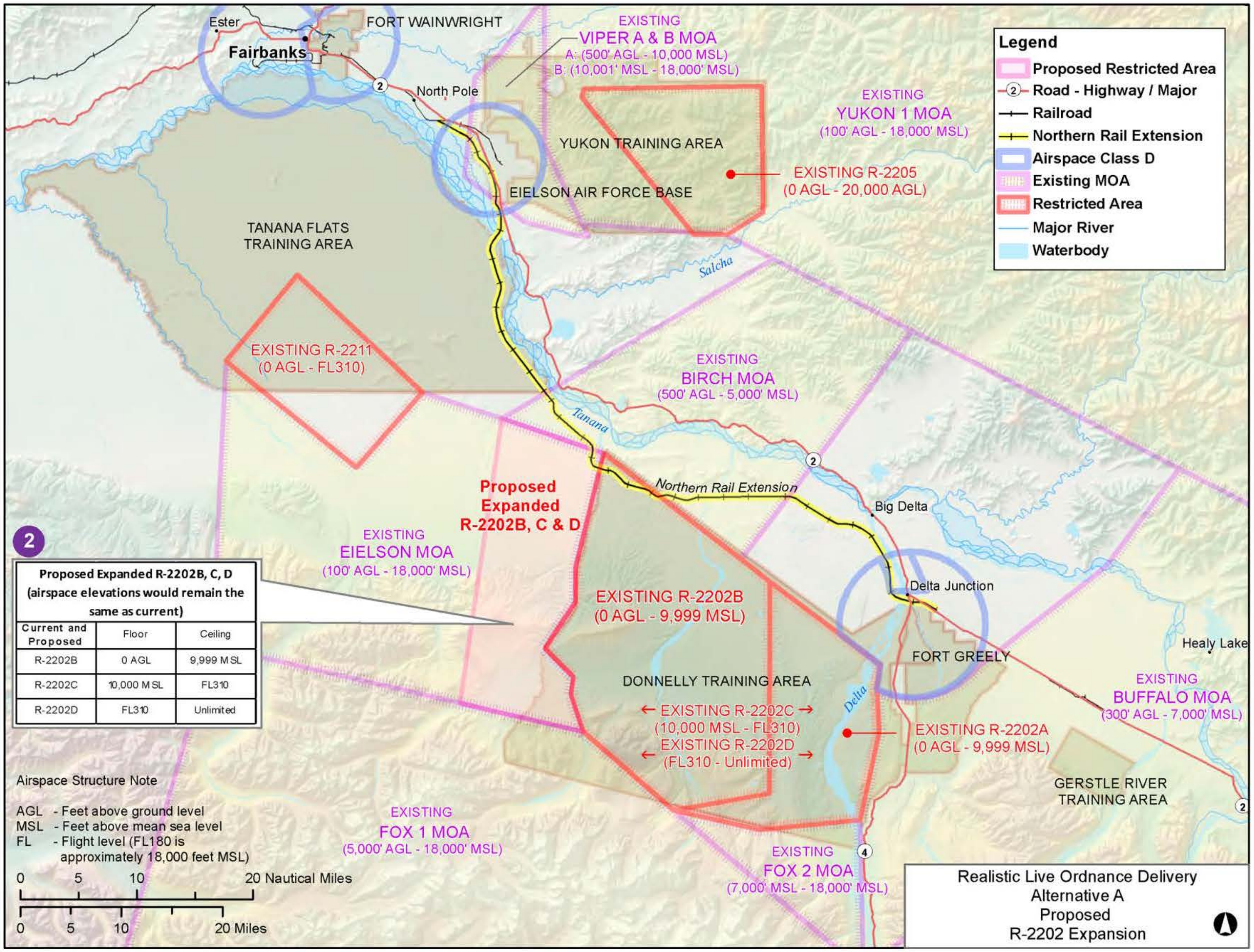
7



Attachment A: JPARC Overview of EIS Proposed Actions and Alternatives

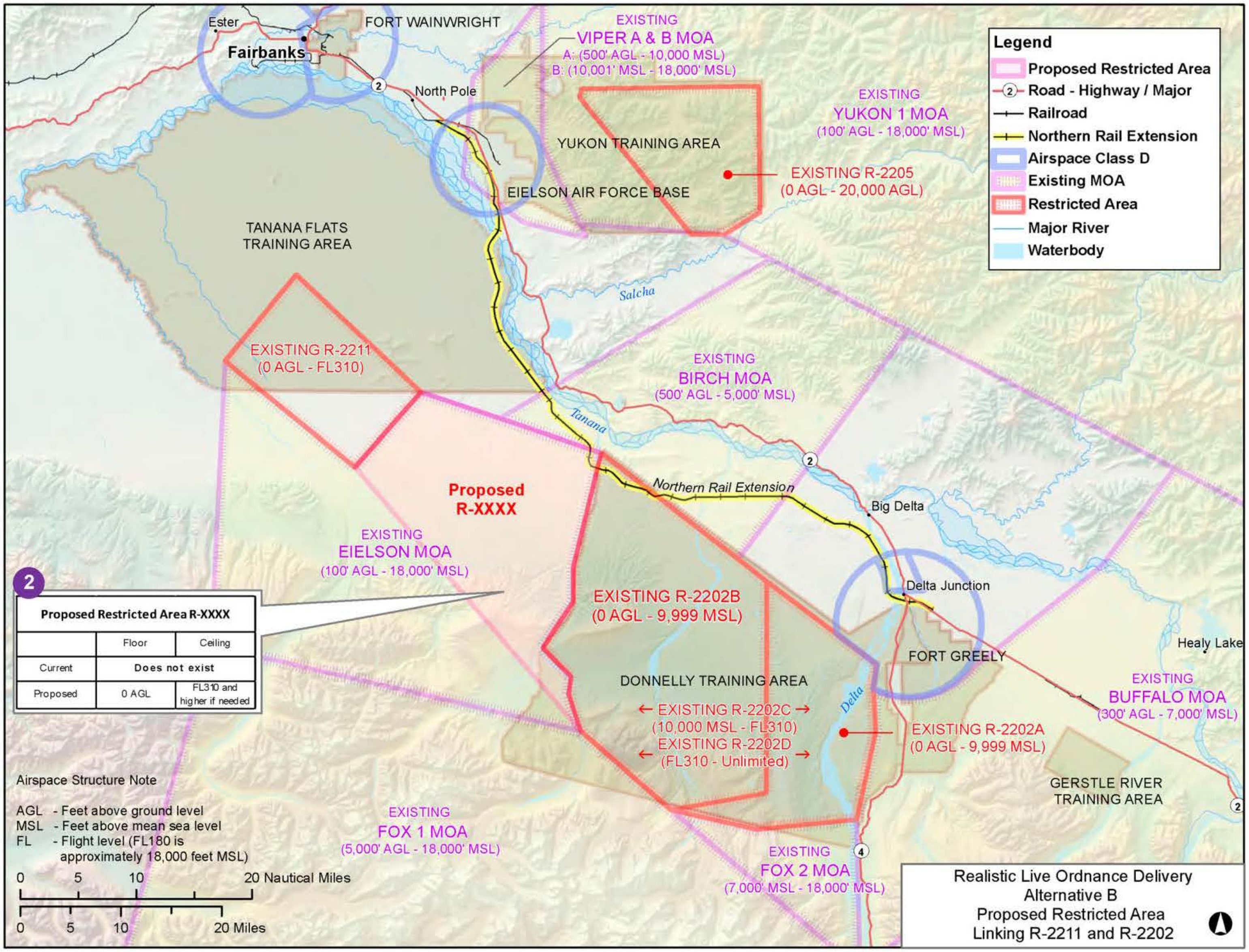


Attachment B: Proposed Fox MOA Expansion

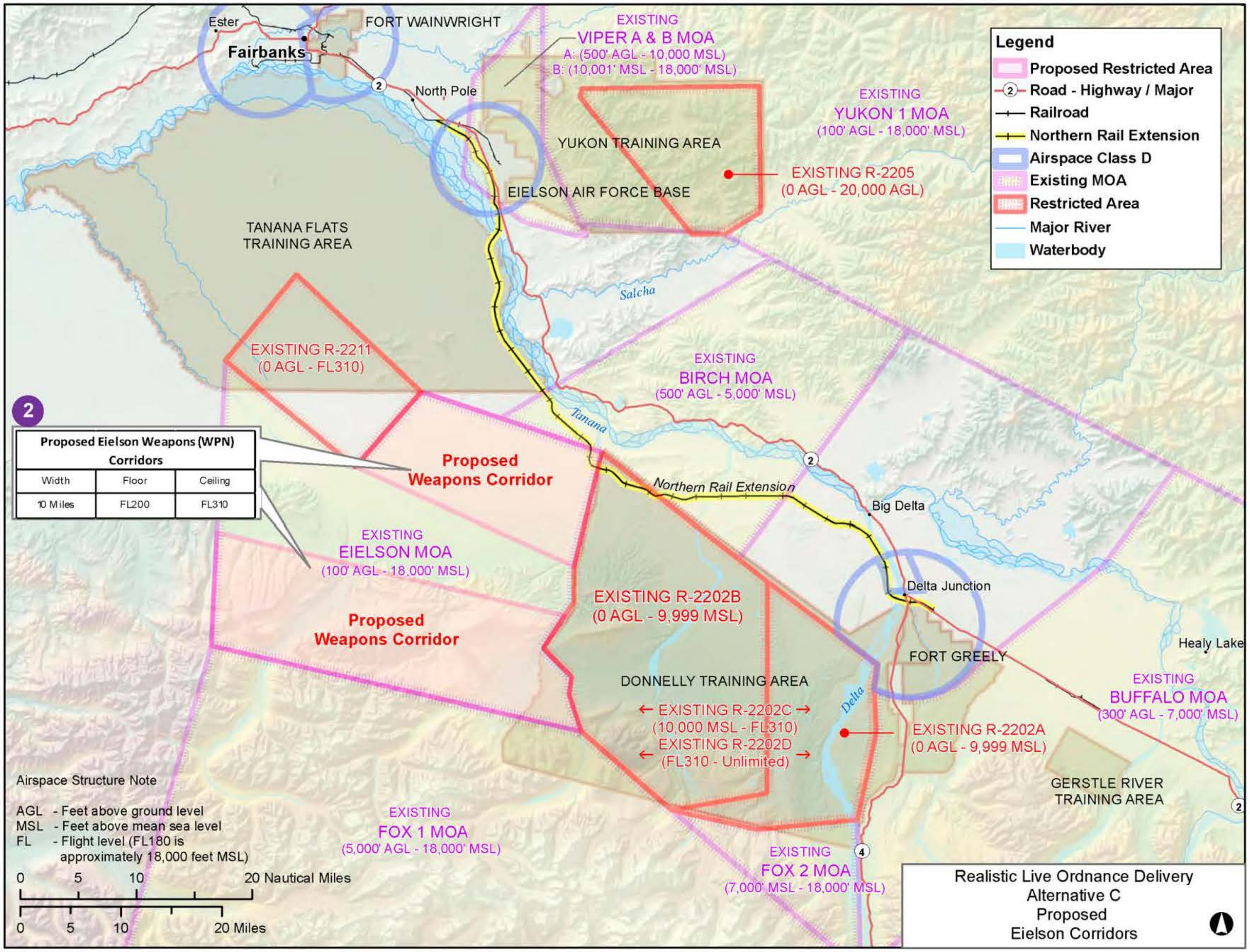


Current and Proposed	Floor	Ceiling
R-2202B	0 AGL	9,999 MSL
R-2202C	10,000 MSL	FL310
R-2202D	FL310	Unlimited

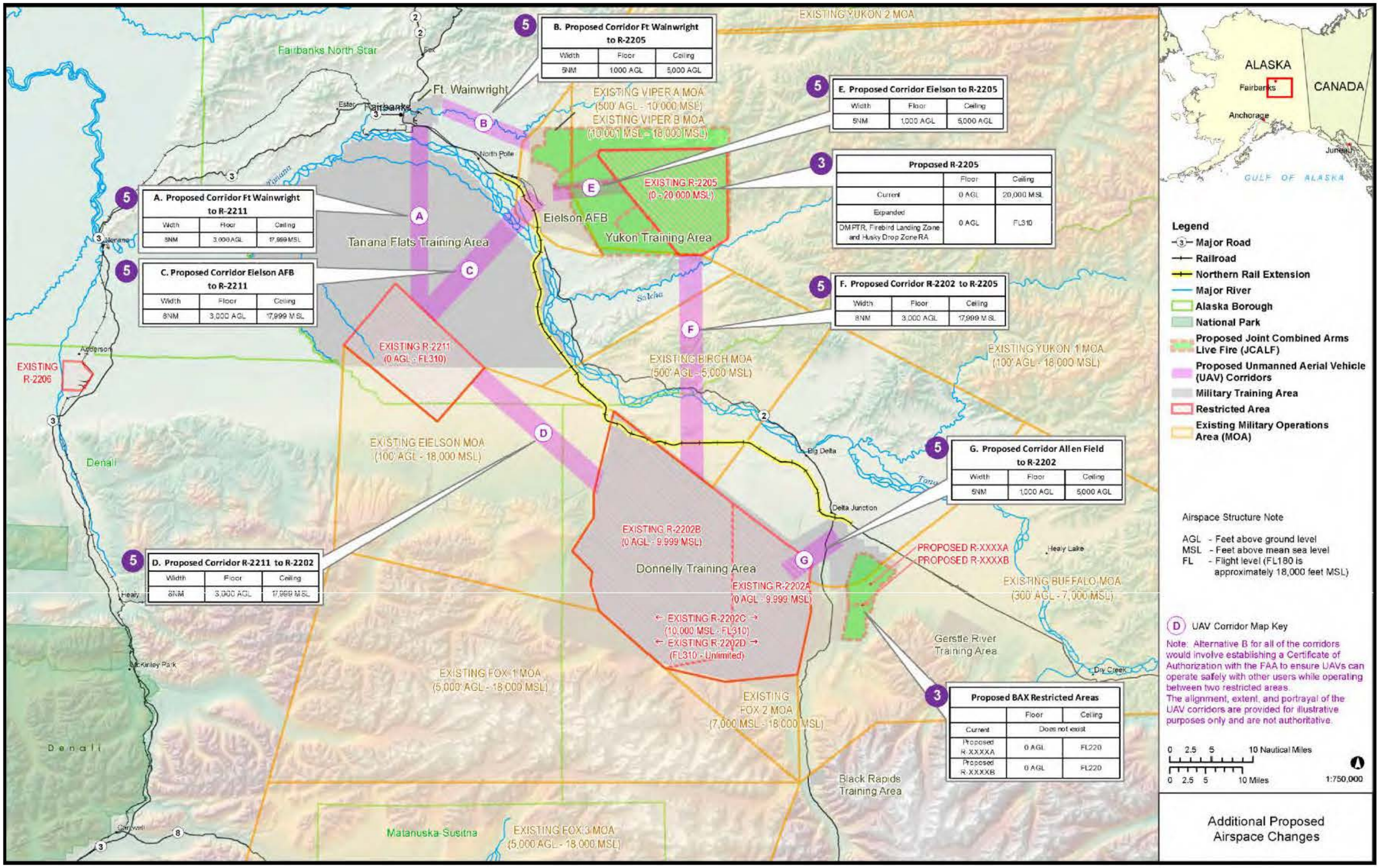
Attachment C: Realistic Live Ordnance Delivery Alternative A
Proposed R-2202 Expansion



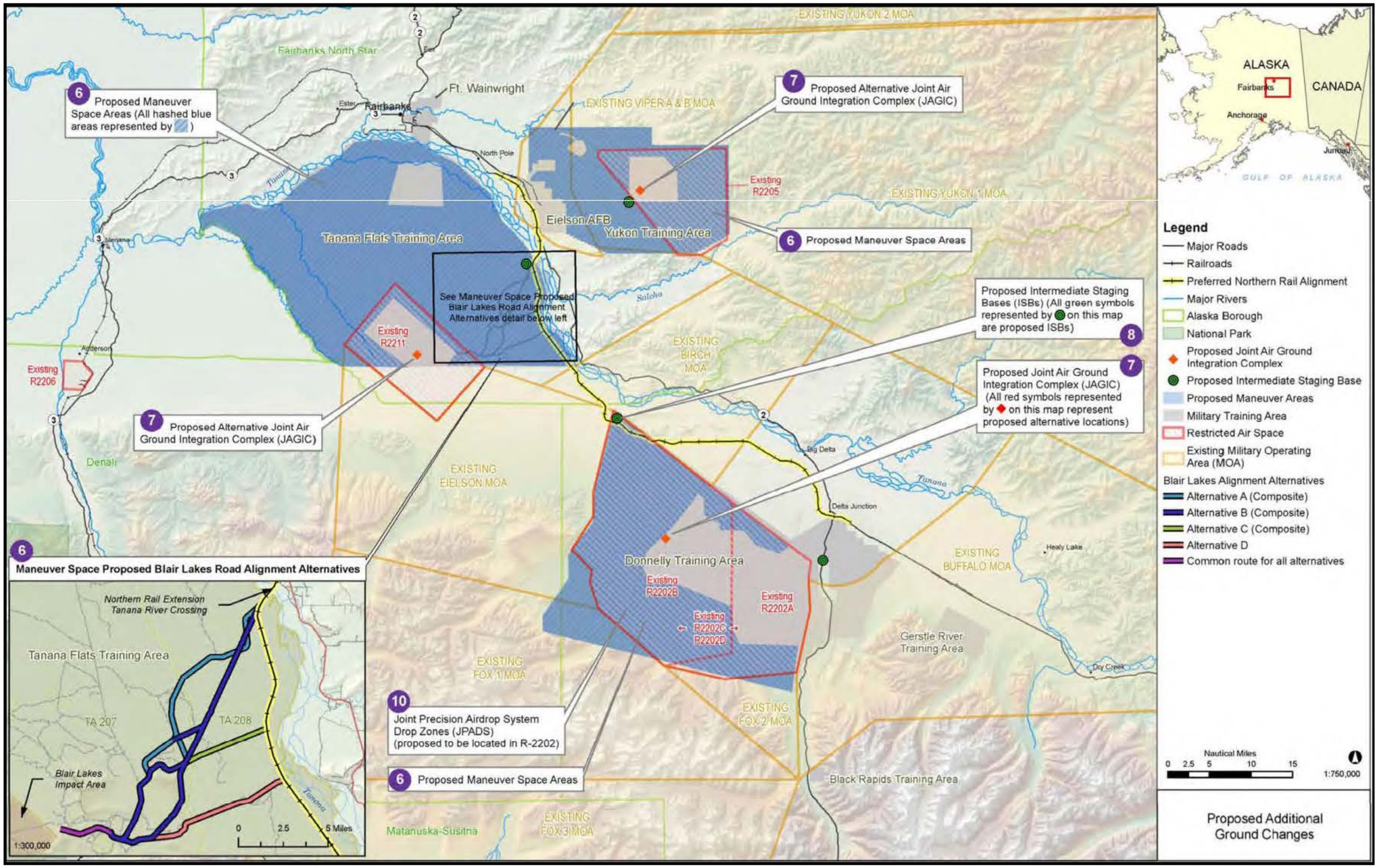
Attachment D: Realistic Live Ordnance Delivery Alternative B
Proposed Restricted Area Linking R-2211 and R-2202



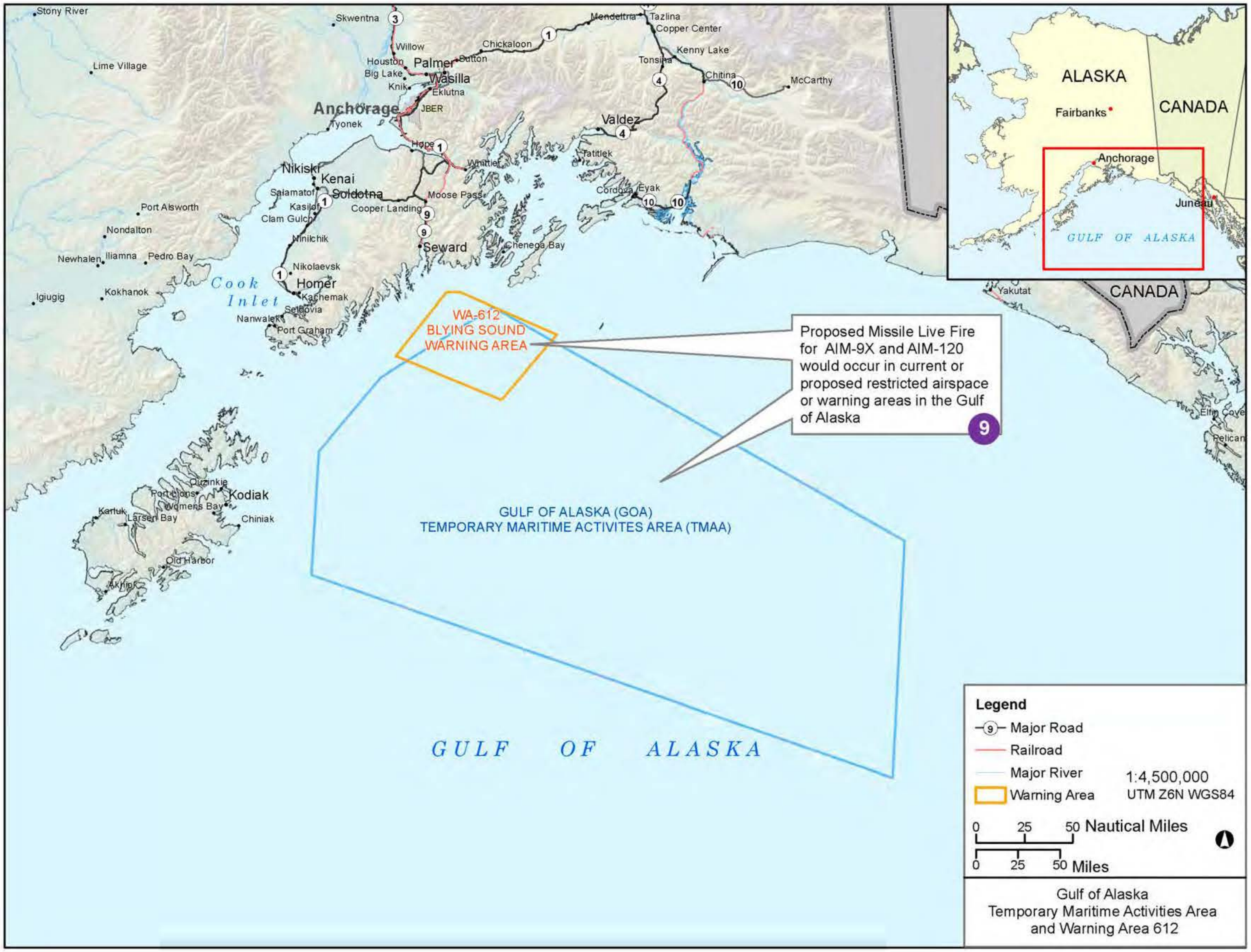
**Attachment E: Realistic Live Ordnance Delivery Alternative C
Proposed Eielson Weapons Corridors**



Attachment F: Additional Proposed Airspace Changes



Attachment G: Additional Proposed Ground Changes



Attachment H: Proposed Missile Live Fire for AIM-9X and AIM-120 in the Gulf of Alaska Temporary Maritime Activities Area and Warning Area 612

Alaska Native Government-to-Government Consultation Letter Mailing List

Larry Sinyon, President, Cheesh-na Tribal Council (old Native Village of Chistochina)
Doug Wade, Chairman, Chickaloon Native Village
Solomon John, First Chief, Circle Native Community
Dorothy Cook, President, Eklutna Native Village
Roy S. Ewan, President, Gulkana Village
JoAnn Polston, Chief, Healy Lake Traditional Council
Phyllis Amodo, First Chief, Kaguyak Village
Debra Call, President, Knik Village
Gordon Pullar, Council President, Lesnoi Village
Nora David, First Chief, Mentasta Traditional Council
Speridon Mitch Simeonoff, President, Native Village of Akhiok
Veronica Nicholas, President, Native Village of Cantwell
Larry Evanoff, President, Native Village of Chenega
Ronald Mahle, President, Native Village of Chitina
Joyce Roberts, First Chief, Native Village of Eagle
Robert Henrichs, President, Native Village of Eyak
Darin Gene,President, Native Village of Gakona
Carl Pete, President, Native Village of Kluti-Kaah
Wally Kvasnikoff, First Chief, Native Village of Nanwalek
Alex Ambrosia, President, Native Village of Ouzinkie
Patrick Norman, First Chief, Native Village of Port Graham
Arnold Kewan, President, Native Village of Port Lions
Roy Denny, President, Native Village of Tanacross
Lori Johnson, President, Native Village of Tatitlek
John Goodlataw, President, Native Village of Tazlina
Donald Adams, President, Native Village of Tetlin
Frank Stanifer, President, Native Village of Tyonek
William Lord, First Chief, Nenana Native Association
Belinda Thomas, President, Northway Village
Crystal Collier, President, Seldovia Village Tribe
Brenda Schwantes, Chairman, Sun'aq (Shoonaq)
Ruth Dawson, Chairman, Village of Afognak
William Miller, President, Village of Dot Lake
Conrad Peterson, President, Village of Old Harbor
Victoria Demmert, President, Yakutat Tlingit Tribe

L.2.3 Alaska Native Government-to-Government Section 106 Consultation Notification Letters

PACIFIC AIR FORCES
ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Ms. Belinda Thomas, Tribal Administrator
Northway Village
P.O. Box 516
Northway, Alaska 99764

Dear Ms. Thomas

The U.S. Department of Army and the Air Force are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Cultural resources are among the important environmental resources that will be addressed during the planning and the preparation of the JPARC EIS. Please let us know if there are any places of traditional cultural or religious importance to members of your tribe that might be affected by these proposed actions.

If you have any questions or require additional information, you may contact Erin Marynak by phone at (907) 552-3791 or by e-mail at erin.marynak.ctr@elmendorf.af.mil.

Sincerely

Patrick O Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. Fox 3 MOA Expansion and New Paxon MOA Proposal
2. Realistic Live Ordnance Delivery Proposal
3. Night Joint Training Proposal
4. AK SHPO Concurrence

Guardian of the North

PACIFIC AIR FORCES
ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

James Mery, Senior Vice President
Doyon Limited
1 Doyon Place, Suite 300
Fairbanks, Alaska 99701

Dear President Mery

The U.S. Department of Army and the Air Force are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Roy Denny, President
Tanacross Village Council
P. O. Box 76009
Tanacross, Alaska 99776

Dear President Denny

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Sincerely

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Vice Commander

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MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Donald Adams, President
Native Village of Tetlin (IRA)
P.O. Box 797
Tetlin, Alaska 99779

Dear President Adams

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JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. William J. D. Lord, First Chief
Nenana Native Association
P.O. Box 369
Nenana, Alaska 99729

Dear Chief Lord

The U.S. Department of Army and the Air Force are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Ms. JoAnn Polston, President
Healy Lake Village
P.O. Box 74090
Fairbanks, Alaska 99706

Dear President Polston

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ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Conan Goebel, First Chief
Native Village of Eagle (IRA)
P.O. Box 19
Eagle, Alaska 99738

Dear Chief Goebel

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Patrick O Moylan

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PACIFIC AIR FORCES
ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force, Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Ms. Veronica Nicholas, President
Native Village of Cantwell
P.O. Box 94
Cantwell AK 99729

Dear President Nicholas

The U.S. Department of Army and the Air Force are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. Fox 3 MOA Expansion and New Paxon MOA Proposal
2. Realistic Live Ordnance Delivery Proposal
3. Night Joint Training Proposal
4. AK SHPO Concurrence

Guardian of the North

PACIFIC AIR FORCES
ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

MAR 0 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. William J. Miller, President
Village of Dot Lake
P. O. Box 2279
Dot Lake, Alaska 99737

Dear President Miller

The U.S. Department of Army and the Air Force are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

The *Environmental Impact Statement (EIS) for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the JPARC in Alaska* contains six definitive proposals. The Air Force is conducting Section 106 consultation for three projects: Fox 3 Military Operating Area (MOA) Expansion and New Paxon MOA, Realistic Live Ordnance Delivery (RLOD), and Night Joint Training (NJT) proposals [Attachments 1-3]. The U.S. Army Garrison Fort Wainwright is conducting Section 106 consultation for the remaining three projects.

The Alaska State Historic Preservation Office (AK SHPO) concurs with the determination that a finding of no historic properties affected is appropriate for the Fox 3 MOA Expansion and New Paxon MOA and the NJT [Attachment 4]. AK SHPO was unable to concur with the proposed finding of no historic properties affected for the RLOD proposal until cultural resource surveys of new proposed target areas are completed.

Cultural resources are among the important environmental resources that will be addressed during the planning and the preparation of the JPARC EIS. Please let us know if there are any places of traditional cultural or religious importance to members of your tribe that might be affected by these proposed actions.

If you have any questions or require additional information, you may contact Erin Marynak by phone at (907) 552-3791 or by e-mail at erin.marynak.ctr@elmendorf.af.mil.

Sincerely

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. Fox 3 MOA Expansion and New Paxon MOA Proposal
2. Realistic Live Ordnance Delivery Proposal
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OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Ms. Kathryn Martin
Vice President of Land and Resources, AHTNA Inc.
P.O. Box 649
Glennallen AK 99588

Dear Ms. Martin

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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The Alaska State Historic Preservation Office (AK SHPO) concurs, Attachment 1, with the determination that a finding of No Historic Properties Affected is appropriate for the RLOD proposed action. Survey results are attached, Attachment 2, that supports this finding.

If you have any questions or require additional information, you may contact Erin Marynak by phone at (907) 552-3791 or by e-mail at erin.marynak.ctr@us.af.mil.

Sincerely

Patrick O. Moylan
PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. AK SHPO Concurrence
2. Realistic Live Ordnance Delivery Survey Results

Guardian of the North

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OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Eric Rice, President
(or current President)
Village of Dot Lake
P. O. Box 2279
Dot Lake Alaska 99737

Dear President Rice

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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The Alaska State Historic Preservation Office (AK SHPO) concurs, Attachment 1, with the determination that a finding of No Historic Properties Affected is appropriate for the RLOD proposed action. Survey results are attached, Attachment 2, that supports this finding.

If you have any questions or require additional information, you may contact Erin Marynak by phone at (907) 552-3791 or by e-mail at erin.marynak.ctr@us.af.mil.

Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. AK SHPO Concurrence
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Guardian of the North

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OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Ms. Veronica Nicholas, President
(or current President)
Native Village of Cantwell
P.O. Box 94
Cantwell Alaska 99729

Dear President Nicholas

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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The Alaska State Historic Preservation Office (AK SHPO) concurs, Attachment 1, with the determination that a finding of No Historic Properties Affected is appropriate for the RLOD proposed action. Survey results are attached, Attachment 2, that supports this finding.

If you have any questions or require additional information, you may contact Erin Marynak by phone at (907) 552-3791 or by e-mail at erin.marynak.ctr@us.af.mil.

Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. AK SHPO Concurrence
2. Realistic Live Ordnance Delivery Survey Results

Guardian of the North

PACIFIC AIR FORCES
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JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Conan Goebel, First Chief
(or current First Chief)
Native Village of Eagle (IRA)
P.O. Box 19
Eagle Alaska 99738

Dear Chief Goebel

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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If you have any questions or require additional information, you may contact Erin Marynak by phone at (907) 552-3791 or by e-mail at erin.marynak.ctr@us.af.mil.

Sincerely

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. AK SHPO Concurrence
2. Realistic Live Ordnance Delivery Survey Results

Guardian of the North

PACIFIC AIR FORCES
ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Ms. JoAnn Polston, President
(or current President)
Healy Lake Village
P.O. Box 74090
Fairbanks Alaska 99706

Dear President Polston

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

Attachments:
1. AK SHPO Concurrence
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Guardian of the North

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ELEVENTH AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Donald Charlie, First Chief
(or current First Chief)
Nenana Native Association
P.O. Box 369
Nenana Alaska 99729

Dear Chief Charlie

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

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JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Donald Adams, President
(or current President)
Native Village of Tetlin (IRA)
P.O. Box 797
Tetlin Alaska 99779

Dear President Adams

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
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OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Roy Denny, President
(or current President)
Tanacross Village Council
P. O. Box 76009
Tanacross Alaska 99776

Dear President Denny

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

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PACIFIC AIR FORCES
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JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. James Mery, Senior Vice President
Doyon Limited
1 Doyon Place, Suite 300
Fairbanks Alaska 99701

Dear President Mery

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN, Colonel, USAF
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OCT 1 2 2012

Colonel Patrick O. Moylan
Eleventh Air Force
Vice Commander
9480 Pease Avenue, Suite 118
Joint Base Elmendorf-Richardson Alaska 99506

Mr. Teddy Northway, President
(or current President)
Northway Village
P.O. Box 516
Northway Alaska 99764

Dear Mr. Northway

The U.S. Department of Air Force and the Army are planning a modernization and enhancement of the Joint Pacific Alaska Range Complex (JPARC) pursuant to the Department of Defense joint training needs to allow for optimum use of land, air, and physical assets. This project is considered an undertaking subject to review under Section 106 of the National Historic Preservation Act.

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Sincerely

Patrick O Moylan

PATRICK O. MOYLAN, Colonel, USAF
Vice Commander

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Guardian of the North

L.3 ESA CONSULTATION

L.3.1 U.S. Fish and Wildlife Service

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

March 4, 2011

ALCOM Public Affairs
9480 Pease Avenue, Suite 120
JBER, AK 99506

Re: Scoping Comments for JPARC Modernization and Enhancement EIS

Dear Lieutenant General Atkins:

Thank you for the opportunity to learn of the Joint Pacific Alaska Range Complex (JPARC) Modernization and Enhancement Environmental Impact Statement (EIS) at the public scoping meetings and at the Fairbanks agency meeting on January 21, 2011.

We understand your intent is to prepare an EIS that evaluates the potential environmental consequences associated with modernizing and enhancing current military ground and air training assets in Alaska. The actions would expand and/or establish new Military Training Areas (MOAs), restricted airspace, airspace corridors, expand access to training areas, and develop new ranges and facilities to support training activities.

We also appreciate the invitation to serve as a cooperating agency for this EIS. Instead, as I explained during our initial December 8, 2010 teleconference, the U.S. Fish and Wildlife Service (Service) would prefer to serve as a participating agency for this EIS, and has determined that the Fairbanks Fish and Wildlife Field Office will serve as the primary point of contact that will coordinate reviews and comments for the Service in Alaska.

Herein we identify environmental resources for consideration in the EIS, and convey any initial concerns regarding those resources. We look forward to working with you and your environmental planners to more fully identify issues and potential impacts for consideration in the environmental impact analysis process.

Endangered Species:
Currently, one federally-listed species under the jurisdiction of the Service occurs within the vicinity of the JPARC. That species is the short-tailed albatross (*Phoebastria albatrus*), which is listed as endangered under the Endangered Species Act of 1973(16 U.S.C. 1531 et seq: 87 stat 884, as amended; ESA). It is a pelagic seabird whose range includes the Gulf of Alaska, and it typically occurs in the project area during the April through October time period. This endangered

species occurs in the area of the Proposed Action #9: Missile Live Fire for AIM-9X and AIM-120 in the Gulf of Alaska.

In 2010 the Service reviewed proposed Navy Training Activities in the Gulf of Alaska (two 3-week activity periods from April through October) and determined the activities were not likely to adversely affect endangered short-tailed albatrosses. For that review the Navy produced a Gulf of Alaska Navy Training Activities Biological Evaluation (BE), dated February 24, 2010 for the Temporary Maritime Activities Area. At this point the Service does not know specifically how the training activities proposed for this EIS compare, but recommend that the JPARC review the Protective Measures developed for short-tailed albatross in that 2010 Gulf of Alaska Navy Training BE to learn what steps can be taken to avoid adverse effects to that endangered species. The JPARC will need to evaluate of the effects of the Gulf of Alaska activities on the short-tailed albatross.

Migratory Birds:
Interior Alaska is significant nationally for its concentrations of migratory birds that breed, nest, and molt here during the brief spring and summer months. The Service has a significant amount of information from systematic aerial surveys since 1957 about the location and timing of nesting birds in Interior Alaska, and we look forward to sharing that information with you for the preparation of your Alternatives and production of your EIS. For example, the Service annually conducts the Alaska-Yukon Waterfowl Breeding Population Survey (for example, Mallek and Groves 2008) and also surveys on specific species, such as the Alaska Trumpeter Swan Status Report (Conant et al. 2007).

For the purposes of this scoping letter, we wish to make you aware of the high concentrations of breeding birds in many of the MOAs and Training Areas within the JPARC. As one example, aerial surveys in 2005 of the Gulkana area (which encompasses most of the Proposed Fox 3 MOA Expansion and New Paxson MOA) detected 2,440 breeding pairs of trumpeter swans, and 1,228 swan cygnets (chicks) (Conant et al. 2007), with Figure 1 showing the density of trumpeter swans during the spring and summer season in that area. Many other waterfowl also nest, molt and raise their young in that area.

The Service has concerns about the proposed low altitude flight training areas and their potential to disturb nesting and molting birds. The Service can provide years of breeding waterfowl survey information for much of the JPARC area, and can make specific timing recommendations for your activities to avoid conflicts with breeding birds.

Eagle Nests:
Bald and Golden Eagles, as well as their nests, are protected from take, including disturbance. The Service maintains a raptor-nest database that can provide an indication of past nest activity in proposed project areas. We would be happy to consult this database for your site-specific projects. This database, however, cannot guarantee future nesting activity, so we recommend conducting nest surveys in the early spring prior to construction and when the nests are active and easily identified. Should an active eagle nest be observed in the project area at any time during the project, we recommend reviewing our eagle permit website

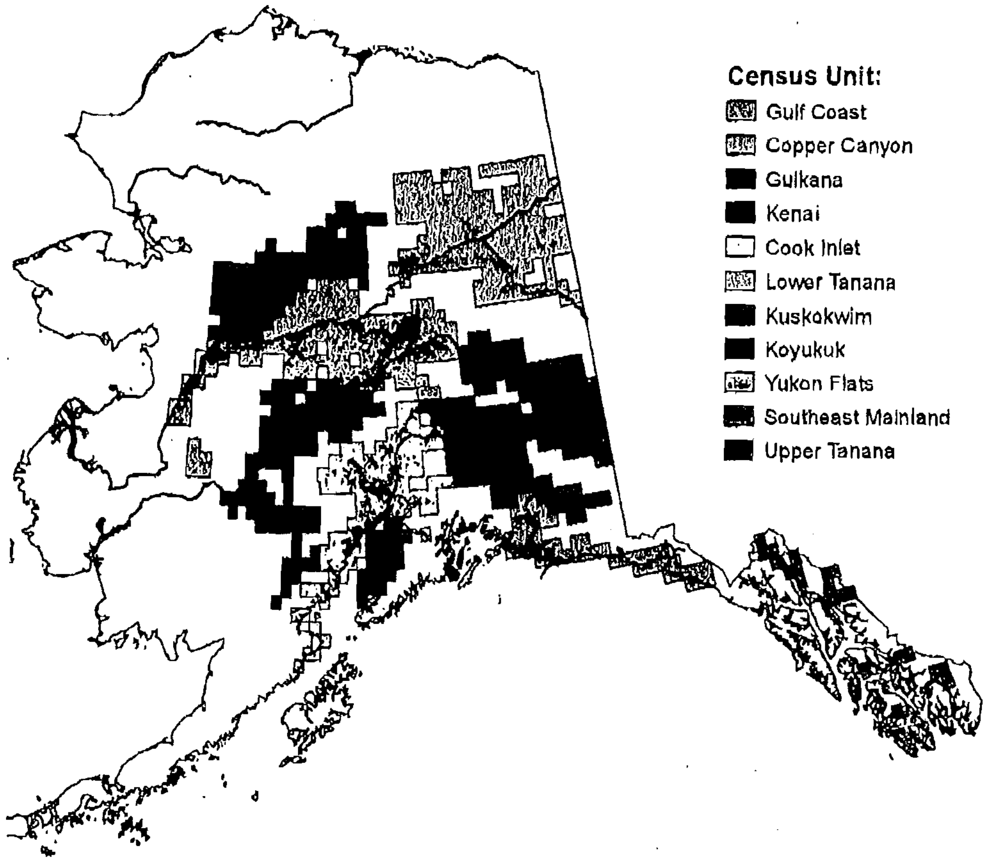

Figure 1. Density of Trumpeter Swans during the spring and summer of 2005 (Conant et al. 2007). Each of the 7,787 points represents a swan observation.

(http://alaska.fws.gov/eaglepermit/index.htm), and contacting our Regional Office (permitsR7MB@fws.gov or 907-786-3685) if you have questions.

Land Clearing:
Migratory bird nests, eggs or nestlings could be destroyed if work is conducted in nesting habitats during the spring and summer breeding season. Please refer to our recommended time periods, which vary by region, for avoiding vegetation clearing to protect nesting migratory birds (http://alaska.fws.gov/fisheries/fieldoffice/anchorage/pdf/vegetation_clearing.pdf). The Migratory Bird Treaty Act prohibits the willful killing or harassment of migratory birds. When practical for authorized military readiness activities, and for all other activities, the Service recommends that clearing, excavation and fill activities in potentially suitable nesting habitats be completed prior to

the nesting season to avoid impacts to breeding migratory birds. If this is not possible, then other measures for avoiding impacts to breeding migratory birds should be initiated. For example, vegetated areas could be cleared prior to the nesting season. This would render the area unsuitable for breeding birds prior to their arrival and facilitate work during the breeding season without impacts to birds. However, we do not recommend large areas (greater than 5 acres) be stripped of vegetation more than one month prior to initiating work, which could result in even greater damage caused by excessive erosion.

We no longer recommend conducting nest surveys during the breeding season as a way to avoid adversely impacting breeding birds. Because nesting birds are secretive, identifying active nests is very difficult, so there is a high likelihood that active nests will be undetected. Nests surveys are a poor substitute for project scheduling that avoids threatening nesting birds. If work cannot be conducted outside the nesting season, or the area cannot be made unsuitable for nesting prior to the breeding season, the project sponsor should demonstrate how they are preventing the willful killing or harassment of migratory birds.

Impacts to Wetlands, Fish, Wildlife and Other Habitats:
Quantifying temporary, indirect and permanent impacts for on-the-ground projects such as Proposed Actions 6 and 8 (enhanced access to ground maneuver space, and intermediate staging bases) are not possible at this stage in the planning process, however, we offer the following as ways to avoid and minimize potential adverse impacts.

Wetlands and Riparian Areas: The Service considers fens, emergent wetlands, ponds, sloughs, watercourses, and riparian areas as higher-value habitat types where disturbance should be avoided or minimized. Disturbance should also be avoided or minimized in other habitats, such as the relatively abundant scrub-shrub wetlands, but the impacts to fish and wildlife are relatively less and will be reflected in our recommendations to the Corps for wetland permits.

Fish and Wildlife: We typically recommend wider buffers for anadromous fish streams than for resident fish streams (e.g., http://alaska.fws.gov/fisheries/fieldoffice/fairbanks/pdf/1_mpzcover.pdf). The Service recommends that design criteria for all stream crossings focus on protecting stream health by maintaining riparian and floodplain processes. All new constructed crossings should maintain the normative physical processes within the stream-floodplain-riparian corridor by: 1) promoting natural sediment transport patterns, 2) providing unaltered fluvial (riverine) debris movement, and 3) maintaining or restoring functional continuity and connectivity of the stream-floodplain-riparian corridor.

To avoid and minimize impacts to aquatic and riparian habitats, all crossings should consist of a bridge or culvert that spans the floodplain, thereby providing for long-term dynamic channel stability, retention of existing spawning habitats, maintenance of food (benthic invertebrate) production, and minimization of risk of failure. All crossing designs should be based on site-specific information such as: estimates of peak discharge, flow velocities and patterns; channel stability; suspended sediment and bed load transport; flooding regime (50-year to 100-year flood frequency and magnitude); cross-section profiles of channel morphology; and water surface elevations.

The Service would like to emphasize the importance of providing free and efficient fish passage for all life stages of fish, while also providing for hydrologic functions such as flushing flows, sediment bed loads, channel meandering and wetland integrity. Longitudinal connectivity (between upstream and downstream sections of a river), vertical connectivity (between the surface and ground water), and lateral connectivity (between a river and its floodplain and surrounding slopes) must be sustained to allow for proper hydrologic functioning.

Mitigation:
Service policy regarding impacts to fish and wildlife habitat includes first avoiding, then minimizing, and finally compensating for the remaining unavoidable impacts. These impacts include direct, indirect and temporal impacts. If there are unavoidable impacts for proposed projects, then the Service recommends compensatory mitigation for the unavoidable impacts by restoring or permanently protecting equal or higher-value wetlands nearby. The type and extent of recommended mitigation for these impacts would normally be based upon the scarcity and value of the wetland habitat impacted by the proposed project as well as any associated indirect or temporal impacts caused by the project. For the more common wetlands, like scrub-shrub, we typically recommend lower compensation ratios. For higher-value wetlands, such as wetlands associated with watercourses, the Service recommends a strategy of no net loss when practicable. If this is not possible, then we typically recommend higher compensation ratios. Since habitat protection does not meet our national goal of no net loss of wetlands (i.e., no new wetlands are created or restored to offset the proposed loss of wetlands), we typically recommend higher mitigation ratios to help offset the consequences of not meeting this goal when habitat preservation is used for compensatory mitigation. This includes recommending higher mitigation ratios for in-lieu fee programs that only provide habitat protection.

Conclusion:
We look forward to sharing any information we may have regarding fish and wildlife resources in the vicinity of your activities. If you have any questions regarding this issue please contact Charleen Veach at 907/456-0272 or charleen_veach@fws.gov.

Sincerely,

for:
Jewel Bennett, Chief
Conservation Planning Assistance Branch

ccc: Ann Rappoport, USFWS, Anchorage
Christy Everett, USACE, Fairbanks

Citations:

Conant, B., J.I. Hodges, D.J. Groves, and J.G. King. 2007. Alaska Trumpeter Swan Status Report 2005. U.S. Fish and Wildlife Service, Waterfowl Management, Juneau, Alaska. 49 pp.

Mallek, E.J. and D. J. Groves. 2008. Alaska-Yukon Waterfowl Breeding Population Survey.

L.3.2 State of Alaska Department of Fish and Game

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

SEAN PARNELL, GOVERNOR

333 Raspberry Road
Anchorage, AK 99518-1599
PHONE: (907) 267-2228
FAX: (907) 267-2433

March 1, 2011

ALCOM Public Affairs
9480 Pease Ave, Ste 120
JBER, AK 99506

Subject: Issue Identification – Joint Pacific Alaska Range Complex

The Alaska Department of Fish and Game (Department) reviewed the December 8, 2010, "Department of the Air Force and U.S. Army; Notice of Intent To Prepare an Environmental Impact Statement (EIS) for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska". We understand the intent of the EIS is to analyze the environmental effects and consequences of the proposed changes and their alternatives. This will include the environmental consequences to airspace, noise, safety, biological resources, socioeconomics, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice and risks to children, subsistence, and cumulative impacts.

The Department appreciates the need and importance for the military to conduct training exercises that, as closely as possible, mimic battlefield conditions. The training conducted can save lives and contribute to the success of the military's national defense mission. Through the development of the EIS, we would like to work with the military to provide and assist in the interpretation of data where possible, and in understanding the area for fish, wildlife, their use and management.

The Department has specific concerns related to the potential impacts of the proposal to wildlife, the ability to perform management and research related to the management and research of fish and wildlife, and the ability of the public to access the area for activities related to the use of fish and wildlife for general and subsistence purposes. The expansion of low-level flight training exercises and other large-scale training exercises (including live fire) across the area under consideration could disturb wildlife in Game Management Units (GMU) 13 and 20. This area comprises one of the most popular and productive ecosystems in the state for the purposes of hunting, trapping, fishing and the harvests of trees, plants and other vegetation for subsistence and general use by the public.

The following comments are provided to assist the planning process in identifying issues for analysis during the EIS process.

Potential Effects to Wildlife

The frequency of low-level flights as indicated in the EIS, and other large-scale training related noise could be a disturbance factor for wildlife of all species. Land mammals such as moose, caribou, bears, wolves and Dall sheep can experience reduced productivity due to disturbance during the

critical periods of birthing, breeding and use of wintering areas. Avian species such as waterfowl and raptors are especially vulnerable during spring and fall migration. Repeated low-level flight disturbance may also alter activity patterns, increasing vulnerability of both land and avian species to predation, particularly for young of the year. Additionally, to our knowledge, impacts of F-22 jet over flights to wildlife have not been evaluated, although noise generated by the F-22 is likely comparable to most aircraft of its class and impacts would likely be similar. This presents concerns, especially given the large expansion of the MOA.

The Nelchina Caribou Herd (NCH) has a very large range within Interior Alaska, and encompasses a significant portion of the area under consideration. The calving grounds of the NCH are relatively concentrated, with the Proposed Fox 5 area centered over it. The NCH typically concentrates in the eastern Talkeetna Mountain foothills from May through July. The NCH moves efficiently throughout this area to utilize new, highly nutritious emergent vegetation and to avoid insects. Caribou calves are born during the month of May, and for their first two months are highly vulnerable to disturbance. External stress during this period can affect caribou physical condition, reducing their survival and productivity. Low-level flight training exercises or other large scale training exercises (including live fire exercises, if any) in this mountainous-foothill terrain could affect the conservation of this herd, and impair the ability of those who rely on it for consumptive and other uses.

The proposed Paxson MOA with its floor of 500 ft AGL may create a disturbance for Dall sheep in the Delta River canyon. The mountainous terrain north of Black Rapids is an important Dall sheep lambing area and important ewe/lamb habitat. Low-level jet aircraft flights, large scale training and live-fire exercises through this area could have the potential to increase lamb mortality.

Human generated waste can attract wildlife, particularly bears, cause them to become habituated to humans, and result in negative interactions. With the addition of up to 1000 ground-based troops using the training area, consideration of how to deal with human generated waste and reducing the potential for negative interactions with wildlife should be analyzed in detail.

Potential Effects to the Departments Administrative Activities for Management and Research Purposes.

The Department is responsible for the sustainability of all fish and wildlife in the State of Alaska, regardless of land ownership or designation, and has the authority, jurisdiction, and responsibility to manage, control, and regulate fish and wildlife populations – including for subsistence purposes – unless specifically preempted by federal law. To perform these responsibilities, the Department has extensive management and research programs that include frequent access by staff to the lands, water, and airspace throughout the State, including the proposed JPARC expansion area.

After reviewing the information provided, Department staff identified concerns related to their ability to perform management and research activities for the administration of fish and wildlife resources in the area. These activities could be altered or potentially compromised by implementation of proposed flight and access restrictions and include potential safety issues due to air space and ground level separation and conflicts with military and Department aircraft operating simultaneously in the area. Additional concerns include restrictions related to the access and use of flight corridors, restrictions involving entry into areas for research and management purposes by air and ground access, and the poor radio communications capabilities that currently exist between civilians and the military in remote areas.

These concerns are exemplified by a review of the Department's extensive research and management activities for fish and wildlife in the Nelchina and Copper River basins in GMU 13. This area, almost completely encompassed by the JPARC expansion areas, comprise one of the most

Page 2

popular and productive ecosystems in the state for the purposes of hunting, trapping, fishing, and berry picking; as well as other traditional and cultural uses. The area is easily accessed from Fairbanks, Anchorage, the Matanuska-Susitna Valley and Copper River basin communities via the Parks, Richardson, Glenn, and Denali highways. Common big game species in this area include black bear, brown bear, wolves, wolverine, moose, caribou, and sheep, and extensive fisheries resources consisting of both resident and anadromous species. Monitoring and managing the vast fish and wildlife resources in this area takes a tremendous amount of aerial survey work using both fixed wing and rotor aircraft throughout the year. Surveys are typically flown between 500' and 7000' above ground level (AGL) and are dependent on being able to rapidly deploy during good weather conditions, when they exist, and the ability to radio track, capture or make direct observations wherever animals of interest are located.

The Department is conducting long-standing, comprehensive management and research projects for moose in portions of GMU 20. Proposed restricted access corridors and expansion within GMU 20 would impair the ability of the Department to continue these projects, increase costs due to the need to circumvent airspace, schedule additional flights and cause researchers to reduce, abandon or forgo future projects monitoring moose or other species if predictable, adequate access to airspace cannot be assured.

Without continued free access to the airspace in the region, particularly below 7,000' (AGL), necessary fish and wildlife population management in this area could be reduced. A reduction in the quantity and quality of data could result in a need to manage species on a more conservative basis, leading to fewer opportunities for harvest, including subsistence harvest. Of particular concern is the active management of the Nelchina Caribou Herd, GMU 13 and 20 moose and wolf populations, and Gulkana River Chinook and sockeye salmon, all of which are highly sought by the public.

Potential Effects to Public Uses

As noted above, the JPARC expansion areas and proposed corridors encompass some of the most popular and productive ecosystems in the state for the purposes of hunting, trapping, fishing, and the harvests of trees, plants and other vegetation for subsistence and general use by the public. The area includes the Nelchina Public Use Area (AS 41.23.040), established by the legislature in 1985 to protect fish and wildlife habitat for continuing purposes, perpetuate and enhance public enjoyment of fish, wildlife and their habitat and to perpetuate and enhance general public recreation in a quality environment.

Public use of this area is an important regional component for outdoor activities. The use is extensive, occurs on a year round basis with access via highway vehicle, ORV, boat, snowmachine and aircraft. In GMU 13, for example, in 1996-97, 6135 hunters sought moose (933 accessing the area by aircraft), and 19,397 caribou hunters used the area. From 2004-08, the annual average angler use was; Chena River – 20,235 days fished, Tangle Lakes complex – 4,108 days fished, Gulkana River (includes Crosswind Lake) – 19,812 days fished, Tyone River drainage (include Lake Louise and Susitna Lake) – 6,630 days fished.

Proposed access restrictions that could accompany the expansion may have a chilling effect on the ability of the public to freely use and enjoy the area. Public access and spontaneous use associated with good weather days could be curtailed, as would public access of desired areas due to corridor closures, the need to request entry authorizations, and other restrictions to airspace, necessitating the public to incur additional costs in fuel and time to avoid military operations. Additionally, Alaska is notorious for poor weather related flying conditions and the ability of private pilots to comply with flight restriction under poor flying conditions may pose a hazard to both military and private pilots operating in the area.

With extensive, widely dispersed, year round public use of the area, low-level jet aircraft flights and large scale training exercises could have the potential to place the general public and the military in close proximity, resulting in concerns for public safety through unintentional contact.

The entire expansion area also encompasses a well-developed remote cabin system, often centered on lakes and rivers, with both year round and seasonal residents. These residents could expect to experience visual and sound disturbance associated with training exercises. Access to these cabins could be disrupted by the proposed flight restrictions.

Subsistence uses within the JPARC area is also extensive and consists of the traditional and cultural uses of fish, wildlife and plants harvested throughout the year. The use of these resources is dependent on their continued sustainability and access. Throughout the planning process, we recommend holding meetings in local area communities to understand the effect of the proposed actions on subsistence uses.

Information Development and Analysis

Through the EIS process the Department encourages the development, presentation and analysis of additional data to assist in informing the decision making process. We recommend detailed maps and information be developed showing proposed flight corridors, restricted areas, seasonality of use and areas where air and ground training may be conducted, including live fire exercises. These uses should then be analyzed in relation to the primary issues we have identified; potential affects to wildlife; potential affects to the Departments management and research activities and effects to the public's ability to access and use the area.

We are interested in working with the Department of Defense during the development of the EIS. Department staff have expertise regarding fish, wildlife and their use within the area and may be able to assist in the evaluation of spatial and temporal management options to facilitate the public's use of the area as well as ensuring our continued research and management efforts to ensure the sustainability of the resources in the area. Please contact Brad Palach at brad.palach@alaska.gov or 267-2145 to assist in coordinating your efforts.

Sincerely,

Craig Fleener
Deputy Commissioner
Department of Fish and Game
State of Alaska

L.4 SHPO CONSULTATION

HEADQUARTERS
ALASKAN COMMAND (ALCOM)
JOINT BASE ELMENDORF-RICHARDSON, ALASKA 99506

January 11, 2012

Colonel Nathan C. Mooney II
Headquarters Alaskan Command
9480 Pease Avenue, Suite 303
Joint Base Elmendorf-Richardson Alaska 99506-2200

Ms. Judith Bittner
Alaska State Historic Preservation Officer
Office of History and Archaeology
Department of Natural Resources
550 West 7th Avenue, Suite 1310
Anchorage Alaska 99501

Dear Ms. Bittner

The Alaskan Command (ALCOM) requests your concurrence with the finding of No Historic Properties Affected for three proposed actions: Fox 3 Military Operations Area (MOA) Expansion and New Paxon MOA, Realistic Live Ordnance Delivery (RLOD), and Night Joint Training (NJT).

The military land ranges, maritime training areas, and airspace that compose the Joint Pacific Alaska Range Complex (JPARC) provides a critical training and testing environment to the U.S. Department of Defense (DOD) units based in Alaska. Pursuant to guidance and philosophy found in DOD Directive 1322.18, *Military Training*, and in the U.S. Pacific Command's Alaska Joint Training Program of Excellence, ALCOM has coordinated with the Services (Army, Navy, and Air Force) to develop a strategy to identify joint training opportunities in Alaska, to maximize the utilization of scarce training resources, and to improve joint context training at all levels.

The *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska* contains six definitive proposals. Of the six, the U.S. Army Garrison Fort Wainwright, Alaska will be conducting any needed Section 106 consultation for three of the projects affecting Army-managed lands. The Air Force will be conducting any additional Section 106 consultation for the three remaining projects that are referenced in this letter. The following potential effects have been consolidated from these proposals:

Fox 3 MOA Expansion and New Paxon MOA
Area of Potential Effects: The Area of Potential Effects for this proposal consists of the land beneath the proposed Fox 3 MOA expansion and the proposed new Paxon MOA [Attachment 1].
Noise: Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that

Guardian of the North

subsonic operations would be even less likely to cause damage. Thus, resources are unlikely to be affected by aircraft overflights.

Ground Disturbance: It is expected that there would be minimal ground disturbance associated with the action. The additional dry targets proposed would be trailers and nonfunctional threat vehicles that would be located on existing highway pullouts, campgrounds, gravel pits, or similar temporary locations. No new construction would be associated with this action.

Cultural Resources: There are no National Register–listed properties beneath the proposed Fox 3 expansion or the proposed new Paxon MOA.

Realistic Live Ordnance Delivery

Area of Potential Effects: The Area of Potential Effects for the proposed RLOD undertaking consists of the Oklahoma Impact Area and two new temporary target areas within Donnelly Training Area, the Blair Lakes Impact Area of Tanana Flats Training Area, and the land beneath the existing Eielson MOA where the expanded or new restricted areas would be located [Attachment 2]. Similar to the proposed Fox 3 MOA expansion and the proposed new Paxon MOA described above, the potential for the undertaking (establishment of expanded or new restricted areas and their training use) to have adverse effects on historic properties is very low.

Noise: The annual average noise levels under the proposed action are not expected to noticeably change. Changes in instantaneous noise levels of less than 3 decibels (dB) are typically not noticeable in non-laboratory conditions, nor would the noise be sufficient to damage any archaeological or historical architectural sites. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage.

Ground Disturbance: There would be no significant construction activities associated with the RLOD proposed action. Ground disturbance would result from the establishment of two new target areas within Donnelly Training Area and their training use for the delivery of inert ordnance.

Cultural Resources: There are no National Register–listed properties beneath the Realistic Live Ordnance Delivery proposed action. The general locations of the proposed target areas will be surveyed for the presence of cultural resources, and the final target sites and impact areas will be established where no cultural resources are located. Should resources of cultural significance be discovered, range officers would alert US Army Garrison Fort Wainwright's Cultural Resource Manager.

Night Joint Training

Area of Potential Effects: The Area of Potential Effects for the proposed NJT undertaking consists of the existing Special Use Airspace (SUA) [Attachment 3]. Similar to the proposed undertakings described above, the potential for the NJT undertaking (extending operating hours to allow after-dark events for the Air Force during major exercises) to have adverse effects on historic properties is very low, and identification efforts were limited to searches of the records of the National Register of Historic Places and National Historic Landmarks Program.

Noise: Noise levels experienced on the ground would be exactly the same as noise levels experienced currently, but noise events would occur at later times. Several noise-sensitive areas have been established in areas beneath JPARC SUA, and pilots avoid these areas during training.
Ground Disturbance: There would be no ground effects associated with the NJT proposed undertaking.
Cultural Resources: Several National Register-listed properties underlie JPARC SUAs. However, since the proposal does not involve any changes in the structure or dimensions of military airspace, there would be no new impacts on cultural resources.

Based on the nature of the proposed actions, no historic properties will be affected within the Areas of Potential Effect for the Fox 3 MOA Expansion and New Paxon MOA, Realistic Live Ordnance Delivery, and Night Joint Training proposals. Pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 USC 470), and according to the regulations governing Section 106, 36 CFR Part 800 "Protection of Historic Properties," a determination is made of No Historic Properties Affected.

All correspondence associated with this consultation will be included in the Administrative Record of the EIS. The Draft EIS is scheduled for release on March 30, 2012. If you have any questions regarding the proposals or regarding this request, please feel free to contact Mr. Jamie Spell at (907) 552-1695, LTC Russell Price at (907) 552-3683, or Ms. Erin Marynak at (907) 552-3791.

Sincerely

NATHAN C. MOONEY II, Colonel, USAF
Director for Logistics

Attachments:
1. Fox 3 MOA Expansion and New Paxon MOA Proposal
2. Realistic Live Ordnance Delivery Proposal
3. Night Joint Training Proposal

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS & OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

SEAN PARNELL, GOVERNOR

550 WEST 7TH AVENUE, SUITE 1310
ANCHORAGE, ALASKA 99501-3565
PHONE: (907) 269-8721
FAX: (907) 269-8908

January 23, 2012

File No.: 3130-1R AIR FORCE

Nathan C. Mooney II, Colonel, USAF
Director for Logistics
Headquarters Alaskan Command
9480 Pease Avenue, Suite 303
JBER, AK 99506-2200

Subject: Alaskan Command (ALCOM) Three Proposed Actions: Fox 3 Military Operations Area (MOA) Expansion and New Paxon MOA, Realistic Liver Ordnance Delivery (RLOD), and Night Joint Training (NJT)

Dear Colonel Mooney:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated January 11, 2012) on January 12, 2012. We also greatly appreciate the information provided to our staff by Ms. Erin Marynak regarding the subject undertakings during a conference call on January 18.

Following our review of the documentation provided, we concur with your determination that a finding of **no historic properties affected** is appropriate for the Fox 3 MOA Expansion and New Paxon MOA and the Night Joint Training. We understand that these undertakings will involve no new ground disturbance and there would be no substantive change in noise levels that could potentially affect historic properties.

As discussed with Ms. Marynak on January 18, we are unable to concur with your proposed finding of effect for the Realistic Live Ordnance Delivery (RLOD) undertaking at this time. As there are plans to survey the proposed target areas for historic properties, we would greatly appreciate receiving the results of that inventory prior to providing our concurrence.

Should unidentified archaeological resources be discovered in the course of the projects, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) or the Alaska Landmarks Register in consultation with our office.

Thank you for the opportunity to comment. We look forward to continued consultation on the RLOD undertaking. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer

JEB:sad

1317137

STAFF SUMMARY

DATE: 7 February 2012

TO	FROM	
Director of Public Works	Environmental Division-Cultural Resources	
SUBJECT: The Unmanned Aerial Vehicle Corridor Development, Digital Multipurpose Training Range Airspace Expansion, and Battle Area Complex Airspace and Footprint Expansion	**ACTION OFFICER (SIGNATURE)** Julie Esdale	**SUSPENSE**
	TYPED NAME, RANK & PHONE **Julie Esdale** **Archaeologist 361-9405**	

Reason for Action:

FACTS/DISCUSSION

Section 106 of the National Historic Preservation Act requires federal agencies to consider effects undertakings may have on historic properties and provide Advisory Council on Historic Preservation an opportunity to comment.

The attached is a 106 consultation letter for USAG FWA projects: The Unmanned Aerial Vehicle (UAV) Corridor Development, Digital Multipurpose Training Range (DMPTR) Airspace Expansion, and Battle Area Complex (BAX) Airspace and Footprint Expansion on Fort Wainwright, Alaska. The finding for the first two projects is **No Historic Properties Adversely Affected** and the finding for BAX Airspace Expansion is **Historic Properties Adversely Affected.**

RECOMMENDATIONS: Sign attached letter.

COORDINATION

OFFICE	SIGNATURE	CONCUR	NONCONCUR
Cultural Resources Manager	Lisa	2/7/12	
Chief, Conservation		2/7/12	
Chief, Environmental Division		2/7/12	
ENCLOSURES	**APPROVED (SIGNATURE)**	**DISAPPROVED (SIGNATURE)**	
	TYPED NAME & RANK **MICHAEL T. MEEKS** **Director, Directorate of Public Works**	**TYPED NAME & RANK** **MICHAEL T. MEEKS** **Director, Directorate of Public Works**	

USARAK Form 407
1 JAN 95

Office of History and Archaeology: Cultural Resources Report Coversheet

(Must Accompany All Compliance Reports Submitted to OHA/SHPO)

Office of History and Archaeology
Division of Parks & Outdoor Recreation
Alaska Department of Natural Resources
550 W. 7th Ave., Suite 1310
Anchorage, AK 99501-3565

Phone: (907) 269-8721
Fax (907) 269-8908
http://www.dnr.state.ak.us/parks/oha/index.htm

Was this survey/investigation(Check one): *Negative* [ ] *Positive* [x]

Negative = no cultural resource sites were discovered or reported on.
Positive = new sites were discovered or known sites were visited and reported.

*Note: Alaska Heritage Resources Survey (AHRS) numbers are **required** for reported cultural resource sites, including buildings. (Assigning an AHRS number is critical for record keeping and does not indicate whether the site has been evaluated for its historic significance. AHRS numbers can be obtained by contacting Joan Dale at 907-269-8718).*

Project/Report Information:

- Report Title: *USAG FWA Projects:* **The Unmanned Aerial Vehicle (UAV) Corridor Development, Digital Multipurpose Training Range (DMPTR) Airspace Expansion, and Battle Area Complex (BAX) Airspace and Footprint Expansion**
- Report Author(s): ***Julie Esdale***
- Report Date: ***February 2, 2012***
- Submitting Organization/Agency ***U.S. Army Garrison Fort Wainwright, Department of Public Works***
- Project Name and Project Number: ***The Unmanned Aerial Vehicle (UAV) Corridor Development, Digital Multipurpose Training Range (DMPTR) Airspace Expansion, and Battle Area Complex (BAX) Airspace and Footprint Expansion***
- Principal Investigator (PI) name: ***Julie Esdale***

Geographic Information (attach an extra sheet or cite report page numbers if necessary)

- USGS. 1:250,000 Quadrangle(s) ***Fairbanks, Big Delta, Mount Hayes***
- USGS 1:63,360 Mapsheet(s) ***Fairbanks B1-B4, C1-C4, D1-D4, Big Delta A4-A6, C5-C6, D5-D6, Mount Hayes D3-D6, C4-C5.***
- Meridian/Township / Range / Section (MTRS) location: (all affected sections)

Format example: "F021N018E|13-14" ***See attached maps***

- Verbal description of survey area

(for example: "123 Acme Street," "confluence of Fish and Moose creeks," "Milepost 9-16 of the Smithville Highway")

FWA Cantonment, Tanana Flats Training Area, Yukon Training Area, and Donnelly Training Area

- Does this report contain boundary coordinates for the survey area? Yes [ ] No [X] Page #(s) ____
- Does this report contain boundary coordinates for reported sites? Yes [ ] No [X] Page #(s) ____
- Land owner(s): ***US Army Garrison Fort Wainwright***
- Answer one: Acres Surveyed n/a Hectares Surveyed ____

Cultural Resources Management (CRM) Information

- List AHRS numbers of all investigated or described sites – both within and outside the survey area (attach an extra page if necessary). ***XMH-00274, 322, 323, 902, 903, 1071, 1333, 1360, 1364, 1365, 1366, 1369, 1377, and 1378***
- Is the report part of a National Historic Preservation Act - Section 106 consultation? Yes [X] No [ ]
- Is the report part of an Alaska Historic Preservation Act compliance consultation? Yes [ ] No [X]
- Does the report's data support a submitting agency's determination of eligibility or effect? Yes [ ] No [X]
- Was this report submitted to fulfill State Field Archaeology Permit requirements? Yes [ ] No [X]

Permit No.: ____

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON FORT WAINWRIGHT
1060 GAFFNEY ROAD #6000
FORT WAINWRIGHT, ALASKA 99703-6000

REPLY TO ATTENTION OF:

FEB 07 2012

Directorate of Public Works

SUBJECT: The Unmanned Aerial Vehicle (UAV) Corridor Development, Digital Multipurpose Training Range (DMPTR) Airspace Expansion, and Battle Area Complex (BAX) Airspace and Footprint Expansion

Judith E. Bittner
State Historic Preservation Officer
Office of History and Archaeology
550 West Seventh Avenue, Suite 1310
Anchorage, Alaska 99501-1365

Dear Ms. Bittner:

The US Army Garrison Fort Wainwright, Alaska (USAG FWA) has proposed three separate Joint Pacific Alaska Range Complex (JPARC) Army-related undertakings.

Project 1: UAV Corridor Development - The USAG FWA proposes to establish new restricted airspaces connecting army training areas for UAV's. This undertaking will not require any ground disturbance.

Project 2: DMPTR Airspace Expansion - The USAG FWA proposes to establish a restricted air space over the DMPTR in the Yukon Training Area (YTA) to provide better support for Joint Combined Arms Live Fire training (JCALF). The changes in the restricted airspace have no ground effects.

Project 3: BAX Airspace and Footprint Expansion - The USAG FWA proposes to establish a restricted air space over the BAX in Donnelly Training Area (DTA) east to provide better support for JCALF. The changes in the restricted airspace will require a change in the ground footprint of the BAX Surface Danger Zone.

Section 106 of the National Historic Preservation Act (NHPA) (16 USC § 470, as amended 2000) reviews of these current projects were conducted in January 2012. No historic properties will be affected by the undertakings related to Projects 1 and 2. Application of the Criteria for Adverse Effect [36 CFR 800.5(a)] indicates a finding of "No Historic Properties Adversely Affected" for the UAV Corridor Development and the DMPTR Airspace Expansion. Archaeological sites will be affected by the BAX Airspace and Footprint Expansion undertaking,

in particular, the change in the BAX Surface Danger Zone's ground footprint. Application of the Criteria for Adverse Effect [36 CFR 800.5(a)] indicates a finding of "Historic Properties Adversely Affected" for this project based on the findings outlined below. USAG FWA requests your concurrence with these findings.

Project Setting and Environment

The three proposed projects are located in and around Fort Wainwright's cantonment, YTA, DTA, and Tanana Flats Training Area (TFTA) (Figure 1).

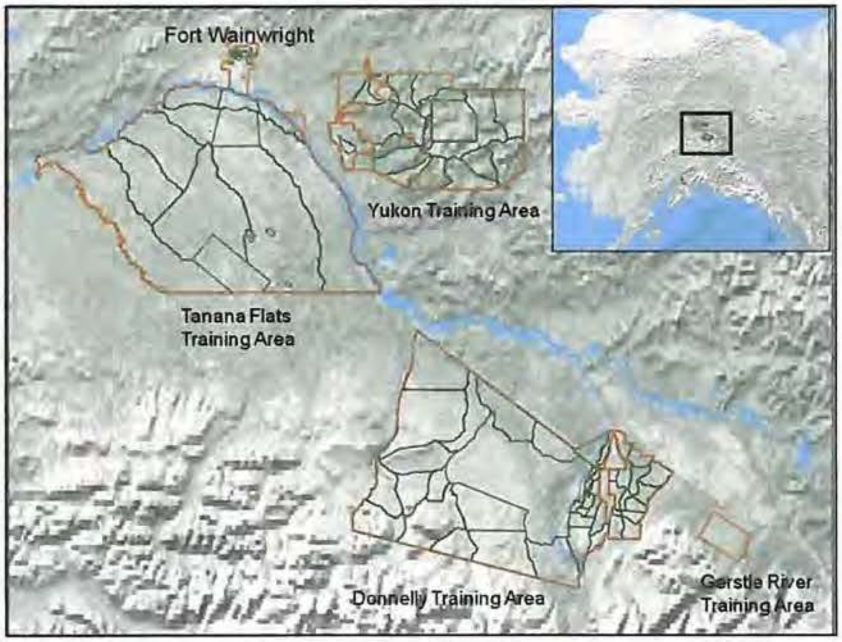

Figure 1. Location of USAG FWA and training areas in central Alaska.

The geology of Fairbanks, Alaska and the surrounding area is characterized by round even-topped, northeast to east trending ridges that rise above adjacent valley floors to an elevation of 450-915 meters above sea level (masl). Bedrock is primarily composed of Precambrian Birch Creek schist with few areas of igneous intrusions, granite and quartz diorite. Most of the area is covered by a thin (1-200 cm) mantle of micaceous aeolian silt (loess) derived from outwash plains south of the Tanana River (Muhs and Budahn 2006). Soils are typically well-drained brown silt loam associated with poorly drained silt loams in depressions and drainages (Natural Cooperative Soil Survey 1999).

2

Near Delta Junction and the DTA, Precambrian schist's are overlain by Cretaceous granites and Tertiary volcanic rocks. Bedrock is covered with glacial and alluvial deposits. Moraine and outwash fans are among the most common surface sediments (Holmes 1965).

Prehistoric Context

Interior Alaska has been continuously inhabited for the last 14,000 years and evidence of this continuum of human activity has been preserved within and around Fort wainwright's training lands. Interior Alaska's ice-free status during the last glacial period provided a corridor connecting the Bering Land Bridge and eastern Asia to North America. This allowed small bands of nomadic peoples to colonize Alaska and the rest of the continent and began a period of habitation in Interior Alaska that has persisted through the entire Holocene, the arrival of European traders in the late 1810s, the Klondike gold rush of the late 19th and early 20th centuries, and the military development of the Interior during the middle of the 20th century. Fort Wainwright cantonment and training lands comprise a vast and still relatively un-surveyed region with areas of high potential for yielding evidence of this activity.

Alaska has long been regarded as the gateway to the Americas and has held archaeological interest as the possible location for the oldest archaeological sites in the New World. This is due to more than Alaska's proximity to Asia and ice-free condition at the end of the Pleistocene. Similarities between archaeological assemblages in Siberia and Alaska and the discovery of lanceolate projectile points in the muck deposits around Fairbanks in the early 1900s (which bore a resemblance to Clovis points of some antiquity in the American southwest) also sparked interest in Alaska as a source area for all Native Americans.

After initial colonization, archaeologists generally divide Interior Alaska's prehistory into three broad archaeological themes: the Paleoarctic Tradition (12,000-6,000 years ago[1]), the Northern Archaic Tradition (6,000-1,000 years ago), and the Athabaskan Tradition (1,300-800 years ago) (Potter 2008.) Archeological materials from these cultures are generally limited to lithic artifacts such as projectile points, cutting tools, scrapers, waste flakes from tool manufacturing, faunal remains, and hearths.

Reconstructions of paleoecological evidence suggest that the end of the Pleistocene was marked by a warming trend in Interior Alaska that may have contributed to initial colonization of the area (Bigelow and Powers 2001). Several sites in areas surrounding Army lands demonstrate that people began living in Interior Alaska 14,000 years ago. Significant sites in the Tanana Valley dating between 14,000-12,000 years ago include Healy Lake (Bigelow and Powers 2001), Walker Road (Bigelow and Powers 2001), Swan Point (Bigelow and Powers 2001), Mead (Bigelow and Powers 2001), and Broken Mammoth

[1] All dates are given in calendar years before present.

(Bigelow and Powers 2001). There are no sites in Alaska, however, that predate the oldest sites in the contiguous United States, nor do Alaska's oldest sites resemble the Clovis culture (Bigelow and Powers 2001). This makes Alaska's earliest inhabitants questionable ancestors to all Native Americans despite genetic evidence pointing to a north-central Asian homeland (Eshleman et al. 2003). The Younger Dryas cooling event from 13,000-12,000 years ago (Bigelow and Powers 2001) may have led to a temporary population decline (Potter 2008) in the Interior before permanent colonization.

The Paleoarctic Tradition is a term is now generally used by archaeologists to refer to the earliest settled people known from all over Alaska. It was originally defined by Anderson[2] (Anderson 1968, 1970) as the earliest microblade-using tradition in the American arctic, with a proposed relationship to Northeast Asian late Pleistocene cultures based on similarities in these distinctive artifact types. Archaeological evidence indicates that early settlers camped on terraces, lakeshores, buttes, and bluffs. By using these locations on high ground, they could locate and track prey that included large mammals such as mammoth and bison. Evidence from the Upward Sun River Site, located just 5km southeast of TFTA, for example, demonstrates that hunter-gatherers in Interior Alaska were concentrating on bison and wapiti at the end of the Pleistocene (The Upward Sun River Site is also known for one of the earliest burials in the Americas. (Potter 2008; Potter et al. 2008; Potter et al. 2011)). It is likely that the treeless environment and nomadic nature of these peoples had a direct impact on the kinds of tools they fashioned. Stone, bone, antler, and ivory provided the most abundant material for manufacturing weapons and cutting tools. Artifacts typically associated with this culture include small stone microblades, microblade cores, bifacial projectile points, and unifacial scraping tools.

In Interior Alaska, this tradition historically included two cultural divisions called the Nenana and Denali complexes. The Nenana Complex was identified by Powers and Hoffecker from sites in the Nenana Valley (Powers and Hoffecker 1989). This complex began approximately 11,000 years ago with an artifact assemblage that included triangular or teardrop-shaped, bifacially worked, projectile points ("Chindadn" points (Cook 1969; 1975; Holmes and Cook 1999)), large unifacial chopper-like tools, and flake tools. The Nenana Complex is defined as lacking microblades, microblade cores and burins and was proposed to predate the microblade-rich Denali Complex. Many Nenana Complex archaeological sites are located in the Tanana Valley, adjacent to Fort Wainwright training lands (Broken Mammoth (Holmes 1996; Yesner et al. 1999), Chugwater (Lively 1996), Donnelly Ridge (West 1967; 1996, Donnelly Ridge is located in DTA), Healy Lake (Cook 1989), Mead (Holmes 2007) and Swan Point (Holmes et al. 1996; Holmes 1998; 2007)).

[2] Anderson called it the "American Palaeoarctic Tradition" but most researchers use the shortened version.

The Denali Complex, dated roughly to 10,500 to 8,000 years ago, was originally defined by West (West 1967; 1975) and includes distinctive wedge-shaped microblade cores, core tablets and their derivative microblades, large blades, biconvex bifacial knives, certain end-scraper forms, and burins. West later defined the Denali Complex as a regional variant of the American Paleoarctic Tradition (West 1981). Denali sites in the vicinity of Fort Wainwright training lands include Mt. Hayes (West 1996), Swan Point (Holmes et al. 1996; Holmes 1998; 2007), and Gerstle River (Potter 2001). At least one site in the TFTA (XMH-2043) has also been dated to this period.

The relationship between the proposed Nenana and Denali complexes is as of yet unresolved. As discussed above, some researchers view the Nenana Complex as a bifacial industry that predates the microblade-based Denali Complex. However, current research at sites such as Swan Point and Broken Mammoth indicates that microblades and burins were used by the earliest known cultures in Interior Alaska, with a later co-occurrence with Chindadn points—the defining artifact type of the Nenana complex. Although some archaeologists still believe that there is a cultural distinction between the Nenana and Denali complexes (e.g. Dumond 2001), the general understanding from Interior Alaskan archaeologists is that there is a behavioral explanation for the presence or absence of microblades in different assemblages (Holmes 2001; Potter 2008; Yesner and Pearson 2002). Moreover, both Nenana and Denali technology persist in central Alaska throughout the Holocene (Bever 2006).

Site density declined in the areas around Fort Wainwright in the early Holocene, suggesting a slight depopulation during a period of climate change which initiated the widespread establishment of spruce forests (Potter 2008). The boreal forest in Interior Alaska was established by 8000 years ago (Bigelow and Powers 2001). Sites from this time period are less well publicized than the older sites, but include Houdini Creek (circa 8600 years old), Hurricane Bluff (c. 9800 years old), Lucky Strike (c. 8500 years old), Gerstle River (c. 10,000 years old), and the Campus Site (c. 7700 years old) (Pearson and Powers 2001, Potter et al. 2007, Potter 2008). Bison, wapiti, and birds were the most important subsistence game during this period (Potter 2007; Potter 2008).

Site density increased again after about 6000 years ago in Interior Alaska (Potter 2008). This population increase coincides roughly with the Northern Archaic tradition and the appearance of side-notched projectile points. Anderson originally defined the Northern Archaic tradition to specifically address notched point bearing stratigraphic horizons that did not contain microblades at the Onion Portage site in northern Alaska (Anderson 1968). Alaskan notched points were generally similar to Archaic-age dart points in the contiguous United States. Time has shown middle Holocene assemblages in Alaska to be quite diverse, however, and it is questionable whether this trait is related to southern forms or if it is a reliable indicator of cultural affiliation (Clark 1992; Cook and and Gillespie 1986). Artifact assemblages associated with this culture can vary but generally

contain myriad tools ranging from bifacial knives and microblades to end scrapers and side-notched points. Middle Holocene hunter-gatherers had a subsistence economy focused on seasonally abundant game including caribou, fish, and as moose (Potter 2008). Notched point assemblages occur in many sites in interior Alaska including over one dozen on Army lands (XBD-277, XMH-277, XMH-283, XMH-303, XMH-309, XMH-874, XMH-950, XMH-1130, XMH-1168, XMH-1300, Robertson et al. 2004; Raymond-Yakoubian and Robertson 2005.) Several sites (XBD-270, XMH-915, XMH-925), including the excavated Banjo Lake site in DTA (XMH-874) have also produced middle Holocene dates from hearth charcoal. The 6300-6700 year old dates from Banjo Lake were also associated with a microblade component (Robertson et al. 2008).

Utilization of microblade and burin-based industries appears to continue through the middle and late Holocene in interior Alaska (Esdale 2008; Potter 2004). By the late Holocene, archaeologists see a shift from seasonal large mammal hunting with a nomadic lifestyle to a focus on seasonally overabundant resources, use of storage, and more permanent settlements (Potter 2008b). Artifact assemblages do not drastically change until the last millennium of the Holocene when microblades disappear from the archaeological record (Potter 2008).

Linguistic evidence suggests that the Athabaskan culture may have appeared in the Tanana Valley as early as 2,500 years ago. Through ethnography, oral history, and a broad array of cultural items, much has been learned about Athabaskan culture and history in the region. Artifacts associated the Athabaskan culture are exceptionally diverse and include bone and antler projectile points, fishhooks, beads, buttons, birch bark trays, and bone gaming pieces. In the Upper Tanana region copper was available and was used in addition to the traditional material types to manufacture tools such as knives, projectile points, awls, ornaments, and axes (Clark 1981). A late prehistoric Athabaskan occupation is recognized at several sites in and around Fort Wainwright's training lands (Andrews 1975; Andrews 1987; Cook 1989; Mishler 1986; Sheppard et al. 1991; Shinkwin 1979; Yarborough 1978). Of particular interest in this regard is a copper projectile point recently found in a buried context at DTA (XBD-272) (Robertson, et al. 2009).

The Athabaskan Tradition includes late prehistoric and proto-historic cultures generally believed to be the ancestors of Athabascan tribes who currently inhabit Interior Alaska. Excavated Athabaskan sites are rare, but the limited body of evidence allows for several generalizations. Raw material usage was reorganized in the Athabaskan Tradition which de-emphasizing stone tool making and increasing the emphasis on the manufacture of items from native copper and organic materials (Dixon 1985). Assemblages include ground and pecked stone artifacts and an increased use of expedient tools. There was a broadening and diversification of the resource base at this time to include small mammal and freshwater marine animals such as fish and mollusks (McFadyen

Clark 1981; McFadyen Clark 1996; Ream 1986; Sheppard et al. 1991; Shinkwin 1979). Athabaskan sites tend to occur in resource-rich areas near lakes, streams and rivers, and are generally characterized by large house pit and cache pit features. Proto-historic Athabaskan assemblages include Euro-American trade goods such as glass beads and iron implements. Sites of this time period reflect an increased reliance on outside trade and include log cabins co-occurring with traditional house pits, as well as a change in site location to maximize trading opportunities (Andrews 1975; Andrews 1977; Andrews 1987; McFadyen Clark 1981; VanStone and Goddard 1981).

Athabascan settlement patterns depended greatly on the availability of subsistence resources, and Interior bands lived a nomadic lifestyle. They often traversed vast areas to support themselves and spent considerable time engaged in subsistence activities. It was often necessary for bands to divide into smaller groups to find game, and preserved fish were used as a staple of the diet in addition to fresh game (Andrews. 1975).

Four Athabascan linguistic and geographic groups have inhabited the Tanana Valley; the Upper Tanana, Tanacross, Tanana and Koyukon. Each group is further distinguished according to geographic location. Bands of the Tanana and Tanacross groups are historically associated with the geographic area that embodies Forts Wainwright and Greely. Salcha, Chena, Wood River, Goodpaster, and Healy Lake bands have inhabited the region since protohistoric times and possibly even prehistoric times (Andrews 1975). Use of the region varied from one band to the next. The Salcha, Chena, Goodpaster, and Wood River bands of the Tanana Athabascans and the Healy Lake band of the Tanacross Athabascans used certain parts of what are now Fort Wainwright and Fort Greely (McKennan 1981). Several villages have been reported on or near Fort Wainwright. One occupied by the Wood River band is said to have been located in the southern part of Fort Wainwright but has not been found (Dixon 1980; Reynolds 1986). The Blair Lakes Archaeological District (FAI-335) on USAG FWA may relate to the prehistory of the Athabaskan tradition. Euro-American historic archaeological sites are also present (Gamza 1995; Phillips 1984).

Historic Context

With the beginning of Euro-American contact in Interior Alaska in the early 19th century, trade influences and influxes of new populations began to change life in the region. Land use patterns shifted from traditional indigenous uses to activities based on Euro-American economic and political systems. Fort Wainwright training lands fall within an area occupied at the time of Euro-American contact by Lower-Middle Tanana Athabascans, including 'bands' described generally as the Salcha, Big Delta-Goodpaster, Wood River, and Chena bands (McKennan 1981; Andrews 1975; Mishler 1986). Historical accounts document traditional settlement patterns that were focused on a widely

mobile season round, with the fall caribou hunt playing a pivotal role in subsistence preparations for the winter and summer activities focused at fish camps, berry and root collecting and in sheep hunting. These activities were frequently communal, with several local bands connected by common interest, geography and intermarriage. Despite anthropological attempts to define boundaries for the peoples living in the lower Tanana River valley, natural terrain served as the only definable boundary to settlement patterns (McKennan 1981).

As Euro-American traders, miners, missionaries and explorers moved into the Tanana River valley, the traditional life ways of local Athabascan groups were disrupted. Access to trade goods and the development of the fur trade not only affected traditional material culture, but also began to dramatically affect subsistence activities and settlement patterns. Similarly, the arrival of missionaries in the Alaskan interior profoundly influenced traditional social organization. The introduction of mission schools for Native children and the doctrine of new religious beliefs contributed to an erosion of traditional practices (McKennan 1981).

Russian fur traders began settling Interior Alaska starting in the 1810s, establishing a post at Nulato on the Yukon River and one at Taral on the Copper River. British traders established Fort Yukon in 1847. Trade goods from these posts may have passed to Tanana Athabascans and Upper Tanana Athabascans through intra-Native trade networks. Direct contact between Tanana Athabascans and white traders increased after the 1860s. With the U.S. purchase of Alaska in 1867, control of trading stations and the fur trade passed to Americans. Through the 1880s, American traders established several additional posts on the Yukon and Tanana Rivers, including locations at Nuklukayet (modern day Tanana), Belle Isle (modern day Eagle), and Fort Yukon.

Trade goods introduced by Euro-American settlers influenced the Native lifestyle. Clothing, staples, tools, and other necessities could be obtained through trade. Guns allowed hunters to obtain game with greater efficiency. Gradually, Athabascan Native groups began to alter their traditional nomadic patterns in favor of more permanent settlements. However, while significant, this contact would not have as dramatic an impact on the region as the discovery of gold in the Interior during the last decades of the 19th century. The towns established by Euro-American settlers at the turn of the 20th century, in response to the Klondike Gold Rush and the eventual military development of the region, would rapidly and permanently change the demography and economy of Interior Alaska.

Gold strikes in the Forty mile River region, Birch Creek area, and the Canadian Klondike began drawing miners and prospectors north in the 1880s and 1890s. In response to this gold rush, E.T. Barnette established a trading post on the Chena River in 1901. The following year, prospector Felix Pedro

discovered gold nearby and a new gold rush soon led to the founding of Fairbanks at the site of Barnette's original trading post. Most mining activities in the region occurred on creeks north of Fairbanks with the town serving as a supply center. Agricultural and other commercial activities, such as lumber, also developed to support mining activities in the Fairbanks area. Homesteads existed on parts of what is today the main post of Fort Wainwright as early as 1904.

In 1898, the discovery of gold in the Tanana uplands began a rush of Euro-American settlement into the Tanana River valley. As the economic importance of the Tanana Valley increased, the need for reliable transportation routes and communication systems rose in tandem. Existing trails, such as the Bonnifield, Donnelly-Washburn and Valdez-Fairbanks trails, saw increased use and development in the first decade of the 20th century. This increase in activity also resulted in the establishment of several roadhouses and posts. In 1906, Congressional appropriations led to improvement of the Valdez-Fairbanks trail, crossing the Alaska Range south of Delta Junction, following the Tanana River to Fairbanks. Completion of the Alaska Railroad in 1923 was followed two decades later by construction of the Alaska Highway in 1942, firmly tying the Alaskan interior to the outside.

As Fairbanks grew in the first decade of the 20th century, several agricultural homesteads were developed on lands now encompassed by sections of the Fort Wainwright cantonment area. These homesteads provided Fairbanks with a variety of agricultural products and wood for fuel, but were subsumed when lands were withdrawn for the creation of Ladd Field, which later became Fort Wainwright (Price 2002.)

Riverboats were the primary means of getting people and supplies into the Interior at the turn of the 20th century. The Fairbanks town site was located at the upper limit of navigation for stern-wheeler riverboats on the Chena River. Upriver from that point, residents navigated the river using shallow-draft boats in summer and sleds in the winter. As commerce in the area increased, roads and trails were constructed, sometimes following earlier indigenous routes. The major overland route to tidewater was the Valdez-Fairbanks Trail, which began as a military trail from Valdez to Eagle in 1899.

Transportation and communication networks including the Alaska Railroad were developed to serve new settlements in Interior Alaska. A branch of the railroad route was extended to Fairbanks in 1904. Roadhouses along the route catered to travelers (However, roadhouses were located out on what are now Fort Wainwright training lands. One property was on the Bonnifield Trail in the TFTA while two roadhouses and a seasonal tent operation existed along the Donnelly-Washburn Trail in the current Donnelly Training Area). Secondary routes connected Fairbanks to the surrounding mining districts.

By 1910, most of the easily accessible placer gold deposits were exhausted and capital-intensive technologies became necessary to extract remaining deposits. These methods were not possible with the existing transportation infrastructure. The completion of the Alaska Railroad in 1923, expanded transportation options for the region connecting Fairbanks to the tidewater at Seward, making large-scale dredging operations economically feasible. Aviation also became a key component of Interior transportation beginning in earnest in the 1920s. However, it was not until 1931, that Weeks Field, originally constructed in 1923 was officially dedicated as an airfield. Industrialized, corporate activity became the hallmark of the region's mining in the remaining years before World War II.

Development in the Alaskan interior increased dramatically with the advent of World War II and subsequent military build-up in Alaska. Of particular significance was the development of airfields near Delta Junction (Fort Greely), Fairbanks (Ladd Field, later Fort Wainwright), and 26 miles southeast of Fairbanks (Eielson Air Force Base). These locations began as lend-lease bases and cold weather testing centers, but soon expanded with the increased need for military support during World War II and later during the Cold War.

Full historic contexts of early mining, transportation, and homesteads on Fort Wainwright have been completed. These studies have determined that there are no properties eligible for the National Register under these contexts. Several village sites associated with the early contact period have been reported near Fort Wainwright. One was reported near Wood River Buttes, two just northwest of the installation's boundary and one near Fairbanks (Reynolds 1986). None have been reported or located on the Main Post.

Status of Archaeological Resources

Archaeological research on Fort Wainwright training areas has resulted in numerous technical reports (Bacon 1979; Bacon and Holmes 1979; Dixon et al. 1980; Esdale and Robertson 2007; Espenshade 2010; Bradley et al. 1973; Gaines 2009; Gaines et al. 2010, 2010; Hedman et al. 2003; Higgs et al. 1999; Holmes 1979; Johnson and Bozarth 2008; Marshal 2007; Potter 2005; Potter et al. 2000; Rabich and Reger 1978; Raymond-Yakoubian 2006; Raymond-Yakoubian and Robertson 2005; Robertson 2010; Robertson et al. 2004, 2006, 2007, 2008, 2009; Staley 1993) and several scientific papers (Holmes and Anderson 1986; West 1967, 1975).

Fort Wainwright and its training lands contain 636 known archaeological sites and four archaeological districts. Sixty sites are eligible for the National Register of Historic Properties (NRHP), 512 sites have not been evaluated, and 64 additional sites have been determined ineligible for the NRHP. Of the eligible or un-evaluated sites, 13 are historic sites and 559 are prehistoric sites.

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Archaeological surveys of Fort Wainwright's main post area began in 1979. Jim Dixon surveyed the north side of the Chena River and Birch Hill area, discovering and relocating several prehistoric archaeological sites (FAI-40, 41, 42, 43, 199, and 200) (Dixon et al. 1980). Surveys of the main post building areas continued in the 1980s by Julia Steele (Steele 1992, 1983) and Georgeanne Reynolds (Reynolds 1983, 1985). No sites were found in these previously disturbed areas. John Cook surveyed the River Road pond in 1996 and found one site (FAI-509), which has failed to be relocated in subsequent attempts. In 2001, the Army began contracting cultural resource surveys and evaluations with Colorado State University's Center for Environmental Management of Military Lands (CEMML). Surveys by several different principles investigators have targeted areas of construction undertakings. Two historic sites (FAI-1603 and 1604) and one additional prehistoric site (FAI-1990) were found in these investigations. In 2011, CEMML completed survey of the entire cantonment, north and south of the Chena River, discovering one additional historic site (FAI-2117). Of the 11 archaeological sites known from the Fort Wainwright cantonment area, 2 (FAI-1603 and 1604) have been determined not eligible. The remaining sites have not yet been evaluated.

Archaeological sites were first identified in the TFTA in 1973 by Zorro Bradley and others who conducted a survey in the Blair Lakes area (Bradley et al. 1973). James Dixon continued surveys for archaeological district designations in the regions of Blair Lakes (District FAI-335), Clear Creek Butte (District FAI-336), and Wood River Buttes (District FAI-337) (Dixon et al. 1980). In 1993, proposed work in the Clear Creek Butte area prompted a contract to relocate several archaeological sites (Staley 1993.) These three districts have been revisited by CEMML archaeologists a few times over the last decade, and notably 92 new sites were found in 2009-2010 during survey of the Wood River Buttes, Salmon Loaf, and north and east of Blair Lakes. In total, archaeologists have identified 147 archaeological sites in the TFTA. Of these sites, 11 have been determined eligible for inclusion in the National Register (FAI-44, 45, 46, 48, 49, 54, and 194 to 198), 2 are not eligible (FAI-1607 and 2046), and 134 remain to be evaluated for eligibility.

The road system in the YTA was the first of many areas to be investigated. Charles Holmes discovered 8 sites in a 1978 road survey (Holmes 1979). John Cook conducted a DOE evaluation on one of these sites in 1979 (Cook 1979.) Michael Kunz surveyed the Stuart Creek Area in 1992 but discovered no archaeological sites and Northern Land Use Research's (NLUR) 1999 survey of Stuart Creek and the YTA road system uncovered 1 historic site (Higgs et al. 1999). CEMML archaeologists have been surveying portions of the YTA in conjunction with construction projects on an annual basis since 2001. Currently, North Beaver Creek, Skyline, Johnson, Quarry, Brigadier, and Manchu Roads in the YTA are almost entirely surveyed, as is the area east of Skyline Road outside of the Stuart Creek Impact Area, McMahon Trench, the Manchu Range, and the majority of training areas 307 and 310 north and south of Manchu and Quarry

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Roads. Twenty-one archaeological sites have been identified in the YTA. Ten of the sites have been determined not eligible for listing in the National Register (FAI-157, XBD-93, 94, 95, 103, 104, 186, 260, 264, and 266) and 11 have not been evaluated. XBD-162 will not be evaluated due to its location in a heavily used portion of the Stuart Creek Impact Area.

Archaeological investigations in what is now the DTA began in the 1960s, when Frederick West was searching for sites related to the first Americans (West 1967). He excavated the Donnelly Ridge Site (XMH-5) in 1964 and found an assemblage containing microblade core technology similar to early Holocene Denali Complex sites. Several surveys of Fort Greely and adjacent training lands in the late 1970's documented 64 new sites (Rabich and Reger 1977, Bacon 1979, Holmes 1979, Bacon and Holmes 1979). Julia Steele surveyed various locations in DTA from 1980-1983, finding 4 additional new sites, (Steele 1980, 1980, 1982, 1982, 1983, and 1983) and Georgianne Reynolds surveyed the Donnelly Dome area in 1988, locating one more (Reynolds 1988). Investigations in DTA from 1992-2002 were by D. Staley (Staley 1993), T. Gamza (Gamza 1995), A. Higgs (Higgs et al. 1999), and D. Odess (Odess 2002). Sixteen new sites were found during this decade of fieldwork and attempts were made to relocate old sites.

Concentrated efforts to expand survey coverage of DTA East began with CEMML archaeologists in 2002. Over 200 new sites were located in the Texas Range, Donnelly Drop Zone, and Eddy Drop Zone in the first half of the decade. In 2007, one site was found in the northernmost portion of DTA West by Ben Potter and others during survey for the Alaska Railroad Northern Rail Extension Project (Potter et al. 2007). In recent years, CEMML research aimed to evaluate many known archaeological sites in DTA for inclusion in the National Register in conjunction with use of the Battle Area Complex (BAX) and its surface danger zone. Sites have also been discovered during surveys for road and trail maintenance. Potential expansions into DTA West, west of the Delta River, have prompted recent surveys into new areas such as Molybdenum Ridge, where 21 new sites were discovered in 2011. Because of its remote setting, however, the archaeology of Donnelly West is still poorly understood and represents a gap in USAG FWA's inventory of cultural properties. The Cold Regions Test Center (CRTC) has also contracted with CEMML and others since the last ICRMP to survey areas in DTA West, east of the Little Delta River, and many new archaeological sites have been recorded (Espenshade 2010).

To date, 454 archaeological sites have been identified within DTA. Forty-nine sites have been found to be eligible for the National Register, and 50 were found not eligible. An additional 355 sites remain to be evaluated. Historic archaeology sites are poorly represented in this region, with only 6 currently known to exist. The Donnelly Ridge District (XMH-388) encompasses Denali sites identified by Frederick West, south and west of Donnelly Dome.

The Gerstle River and Black Rapids Training Areas, also managed by Fort Wainwright, have been infrequently utilized by training activities and very few surveys or identification of archaeological sites have occurred these areas. CEMML archaeologists surveyed two small portions of the GRTA in 2011. One prehistoric site (XMH-1359) is previously known from this training area. Two sites, which have not been evaluated for the NRHP, have been discovered in the BRTA (XMH-317, 318).

Project 1: UAV Corridor Development

Description of Undertaking (36 CFR 800.11 (d) (1))

USAG FWA plans to develop access corridors between launch sites and restricted areas for UAV, in consultation with the Federal Aviation Administration (FAA). The corridors proposed are new controlled airspaces, separate from civilian air corridors. The corridors are located between Fort Wainwright, TFTA, YTA, DTA, and FGA (Figure 2).

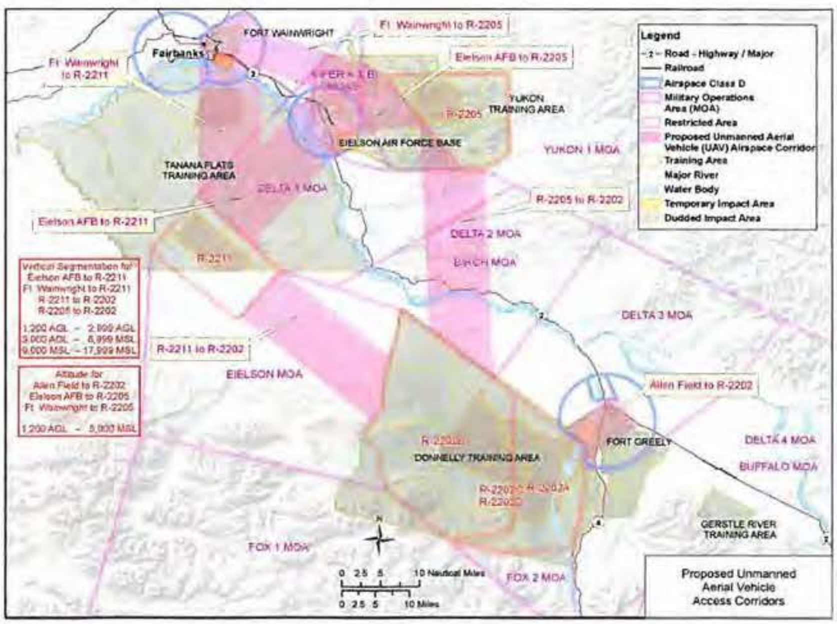

Figure 2. Proposed restricted airspace for UAV's (thick pink lines connecting Fort Wainwright training areas).

Steps Taken to Identify Historic Properties (36 CFR 800.11 (d) (2))

Much of the area beneath the proposed restricted airspaces is not on USAG FWA managed land. Review of the Alaska Heritage Resource Survey identified approximately two dozen archaeological sites under the restricted airspaces. Not all of the area appears to have been surveyed.

Determination of Effect (36 CFR 800.11 (d) (3)) - No Historic Properties Adversely Affected

The time-averaged noise levels in the corridors generated by the proposed UAV operations would be approximately 41 decibels DNL (day-night average sound level) in corridors with a floor altitude of 1,000 above ground level (AGL) and approximately 33 decibels DNL in corridors with a floor altitude of 3,000 AGL. These noise levels would not be sufficient to damage any archaeological or historic sites. No new ground disturbance is associated with the creation of these new restricted airspaces. Because of this, USAG FWA suggests a finding of "No Historic Properties Adversely Affected" for the UAV corridor undertaking.

Project 2: DMPTR Airspace Expansion

Description of Undertaking (36 CFR 800.11 (d) (1))

The USAG FWA proposes to expand the existing restricted airspace over the DMPTR area in YTA. This airspace would be of sufficient size to encompass hazardous activities and weapons footprints for ordnances used in this area. Two airspace alternatives are shown in Figures 3 and 4.

Steps Taken to Identify Historic Properties (36 CFR 800.11 (d) (2))

Although the ground area beneath the possible restricted airspaces has not been surveyed in its entirety, 10 archaeological sites are known to exist.

Determination of Effect (36 CFR 800.11 (d) (3)) - No Historic Properties Adversely Affected

Noise levels generated by munitions firing exceeding 62 decibels CDNL(C-weighted day-night average sound level) would not extend beyond range boundaries and would not be sufficient to damage any archaeological or historic sites. Moreover, there is no ground disturbance related to this undertaking. USAG FWA recommends a finding of "No Historic Properties Adversely Affected" for the expansion of the DMPTR restricted airspace.

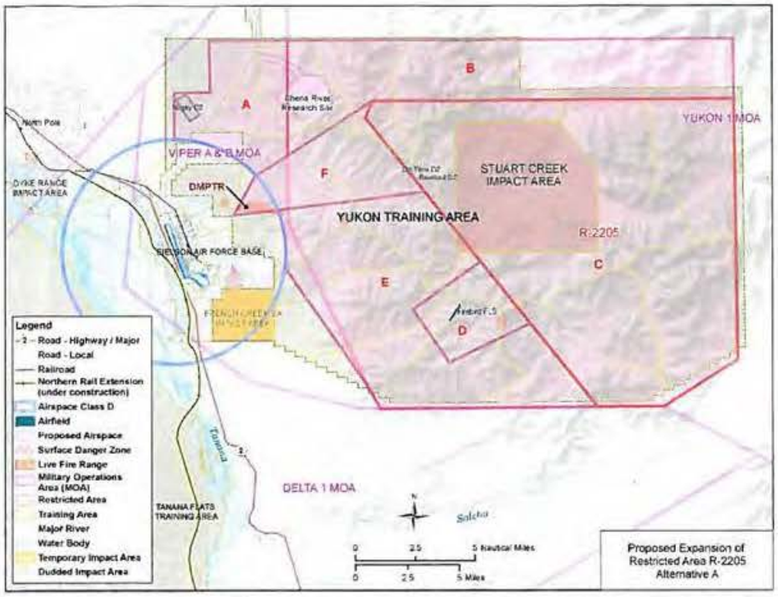

Figure 3. Restricted airspace proposed for over the DMPTR area (Alternative A)

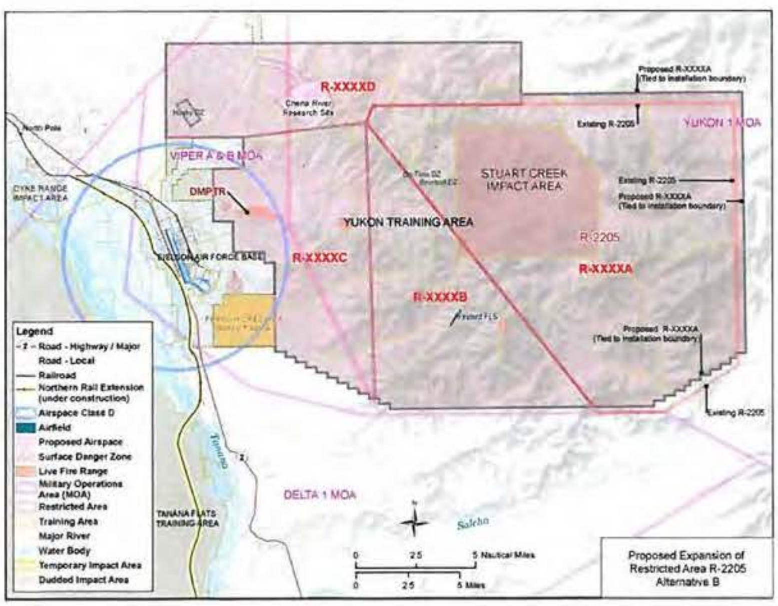

Figure 4. Restricted airspace proposed for over the DMPTR area (Alternative B)

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Project 3: BAX Airspace and Footprint Expansion

Description of the Undertaking (36 CFR 800.11 (d) (1))

The US Army proposes to establish a new restricted airspace over the BAX in DTA East, in one of two overlapping locations (Figure 5 and 6). This airspace is proposed to be of sufficient size to encompass hazardous activities and weapons footprints for the types of ordnance used in the area. The expansion of the airspace will not have any ground effect, but a subpart of this overall project includes the expansion of the BAX Surface Danger Zone. A surface danger zone is an "off-limits" downrange safety buffer zone that covers the maximum distance stray rounds may travel, established for the purposes of protecting human health and safety.

The BAX Surface Danger Zone Programmatic Agreement (FWA-PA-1003) was established and signed by the SHPO on February 5, 2010. On-the-ground training has demonstrated that the boundaries of the BAX Surface Danger Zone should be altered slightly from those originally proposed and consulted on in 2009 and 2010. The undertaking, therefore, also includes a change expansion in the boundaries of the surface danger zone (Figure 7) which will affect an additional known fourteen archaeological sites and require additional archaeological survey.

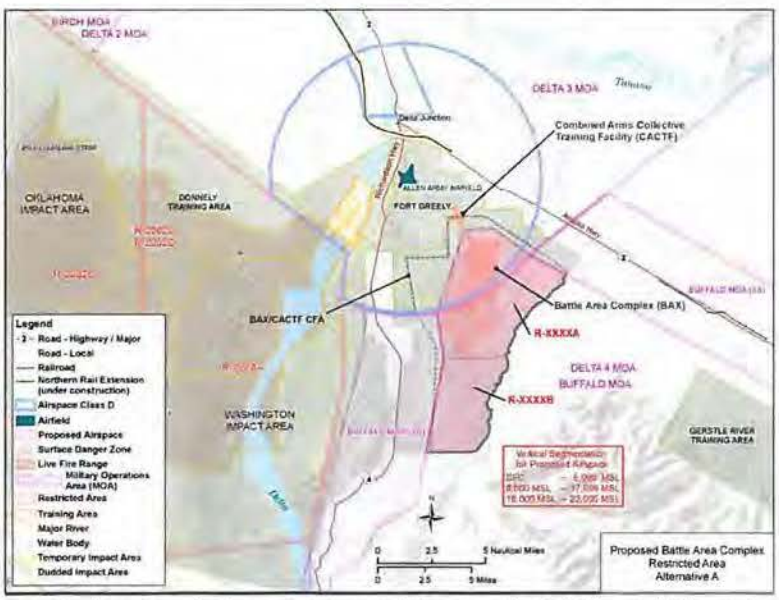

Figure 5. Restricted airspace proposed for over the BAX area (Alternative A)

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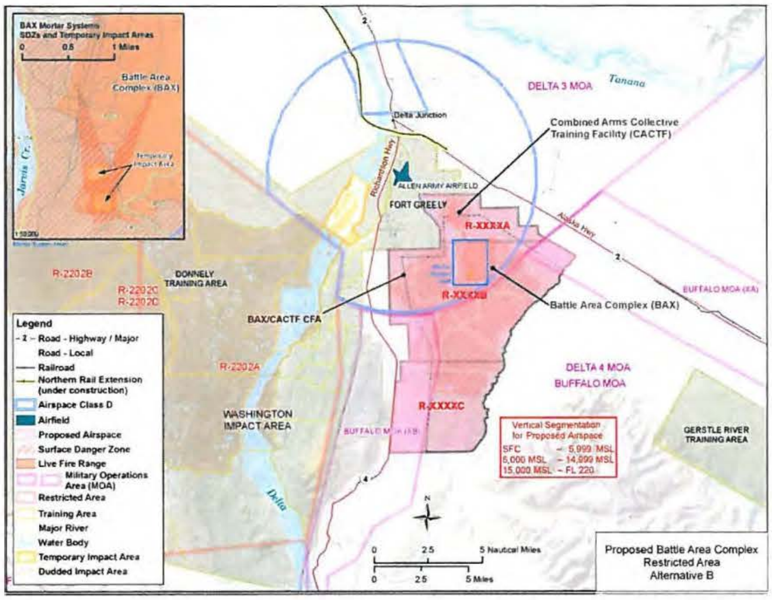

Figure 6. Restricted airspace proposed for over the BAX area (Alternative A)

17

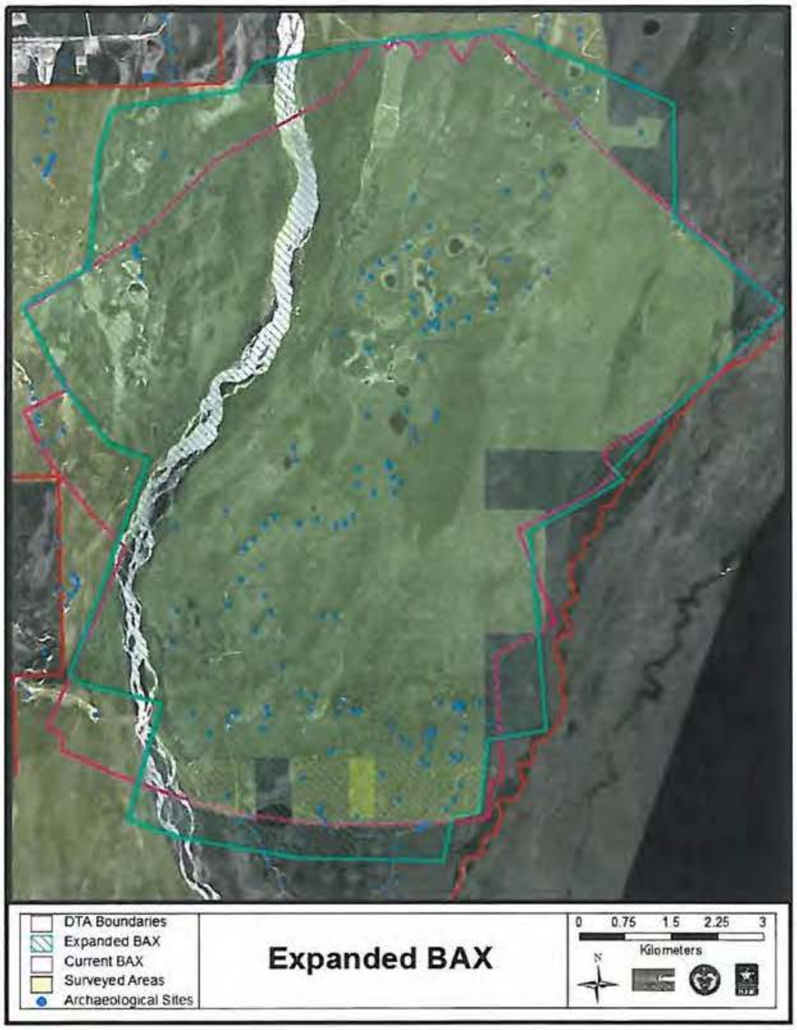

Figure 7. Original and expanded BAX surface danger zone footprints.

Steps Taken to Identify Historic Properties (36 CFR 800.11 (d) (2))

There are 153 archaeological sites located under the entire restricted airspace. One hundred and thirty sites are located within the original boundaries of the BAX surface danger zone (not all sites are eligible for the NRHP). An additional 14 sites are known from the expanded portions of the BAX footprint in the northwest corner and southern end (Figure 8, Table 1). To comprehensively

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identify all archaeological sites in the expanded footprint of the BAX surface danger zone, an additional 1182 acres needs to be surveyed.

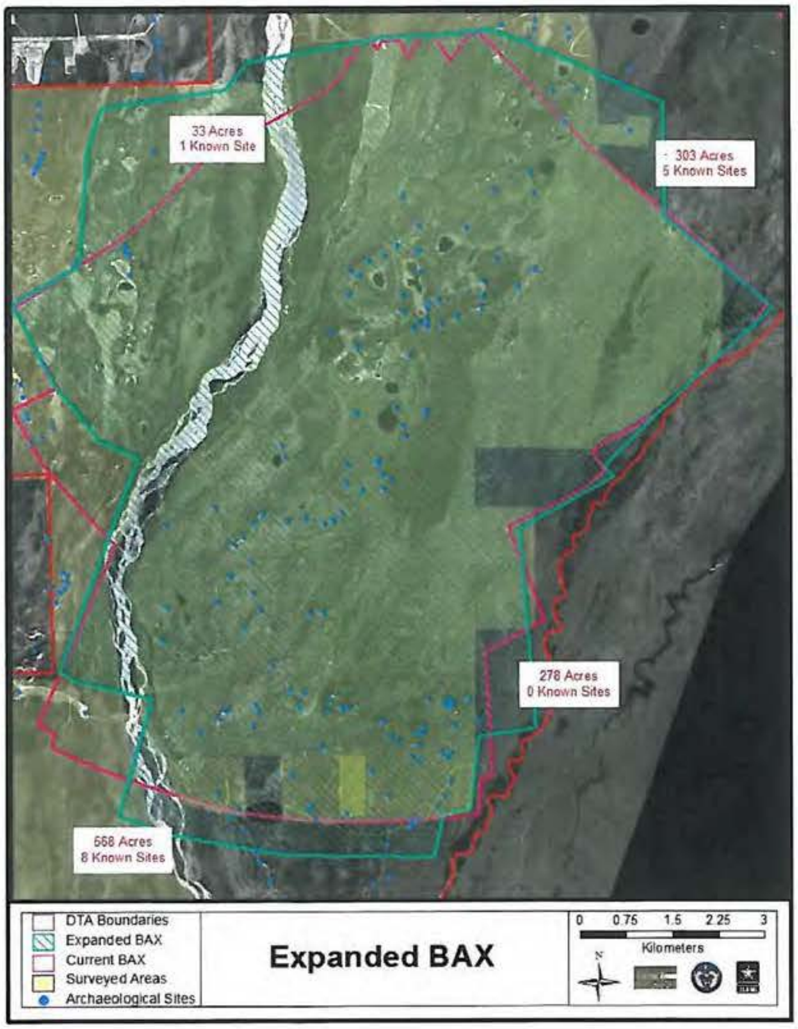

Figure 8. Survey locations in BAX SDZ expansion.

19

Table 1. Known archaeological sites in the expanded BAX footprint

Site Number	Latitude	Longitude	Eligibility	Site Type
XMH-00274	63°49'48"	-145°39'02"	Not evaluated	Surface lithic scatter
XMH-00322	63°55'47"	-145°31'00"	Not evaluated	Surface lithic scatter
XMH-00323	63°55'52"	-145°32'00"	Not evaluated	Surface lithic scatter
XMH-00902	63°56'16"	-145°32'39"	Not evaluated	Subsurface lithic scatter
XMH-00903	63°56'13"	-145°32'05"	Not evaluated	Subsurface lithic scatter
XMH-01071	63°55'44"	-145°40'39"	Not evaluated	Subsurface lithic scatter
XMH-01333	63°56'13"	-145°31'19"	Not evaluated	Surface lithic scatter
XMH-01360	63°49'54"	-145°39'25"	Not evaluated	Surface lithic scatter
XMH-01364	63°49'48"	-145°35'53"	Not evaluated	Surface lithic scatter
XMH-01365	63°49'50"	-145°35'52"	Not evaluated	Surface lithic scatter
XMH-01366	63°49'51"	-145°35'45"	Not evaluated	Surface lithic scatter
XMH-01369	63°49'37"	-145°38'57"	Not evaluated	Surface lithic scatter
XMH-01377	63°49'32"	-145°36'27"	Not evaluated	Surface lithic scatter
XMH-01378	63°49'39"	-145°36'20"	Not evaluated	Surface lithic scatter

Determination of Effect (36 CFR 800.11 (d) (3)) - Historic Properties Adversely Affected

Although 153 archaeological sites are located under the training airspace, no significant impacts are anticipated to cultural resources from the airspace reclassification and its training use. Flying operations are not conducted at a frequency sufficient to result in time-averaged noise levels exceeding 65 DNL. In addition, noise levels generated by munitions firing exceeding 62 decibels CDNL would not extend beyond range boundaries and would not be sufficient to damage any archaeological or historic sites.

USAG FWA recommends a finding of "Historic Properties Adversely Affected" for the known archaeological sites within the expanded footprint of the BAX. We also suggest to amend the existing BAX Surface Danger Zone PA to include the 14 sites mentioned above (Table 1) and any sites found during surveys of the previously un-surveyed areas (Figure 8) bounded by the expanded BAX surface danger zone footprint.

Summary and Recommendations (36 CFR 800.11 (d) (3))

Based on reviews of the UAV Corridor Development and the DMPTR Airspace Expansion, there is no reason to believe that any of these projects warrant any further fieldwork or consideration under Section 106 of the NHPA (16 USC § 470, as amended 2000), and regulations codified in 36 CFR 800 (as amended 2004). USAG FWA has determined findings of **No Historic Properties Adversely Affected** for the UAV Corridor Development and the DMPTR Airspace Expansion.

Further fieldwork in the form of archaeological survey of previously un-surveyed areas and phase two research to determine the eligibility of existing sites is recommended for the BAX footprint expansion undertaking. USAG FWA has determined a finding of **Historic Properties Adversely Affected** for this undertaking and suggests that amendments are made to the existing FWA-PA-1003 to protect and monitor archaeological sites within the expanded BAX footprint. No indications of burials or other human remains are known from within the surveyed area; therefore, barring an unforeseen discovery during the survey, there are no further considerations expected under the NAGPRA (25 USC § 3001 *et seq.*).

Copies of this letter will be sent to federally recognized tribes (Village of Dot Lake, Native Village of Eagle, Healy Lake Village, Nenana Native Association, Northway Village, Native Village of Tanacross, and Native Village of Tetlin). If you have any questions or require additional information, please contact Julie Esdale, USAG FWA Archaeologist at (907) 361-9405 or at julie.a.esdale.ctr@mail.mil.

Sincerely,

Michael T. Meeks
Director, Directorate of Public Works

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STATE OF ALASKA

SEAN PARNELL, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS & OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

550 WEST 7TH AVENUE, SUITE 1310
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March 9, 2012

MAR 2 1 2012

File No.: 3130-1R ARMY

Michael T. Meeks
Director, Directorate of Public Works
Department of the Army
Headquarters, U.S. Army Garrison Fort Wainwright
1060 Gaffney Road, #6000
Fort Wainwright, Alaska 99703-6000

Subject: The Unmanned Aerial Vehicle (UAV) Corridor Development, Digital Multipurpose Training Range (DMPTR) Airspace Expansion, and Battle Area Complex (BAX) Airspace and Footprint Expansion

Dear Mr. Meeks:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated February 7, 2012) on February 13, 2012. Following our review of the documentation provided, we concur with your determination that a finding of **no adverse effect** is appropriate for the following undertakings addressed in the cultural resource inventory report:

- Project 1: UAV Corridor Development
- Project 2: DMPTR Airspace Expansion

We concur that a finding of **adverse effect** is appropriate for the BAX Airspace and Footprint Expansion project. As noted within the documentation provided, there are 14 known sites within the expanded BAX footprint. We agree that an amendment to the *Programmatic Agreement Between the United States Department of the Army and the Alaska State Historic Preservation Officer Regarding Monitoring and Treatment Plan of Archaeological Sites Located within the Surface Danger Zone (SDZ) of the Battle Area Complex (BAX) Training Facility at Fort Wainwright, Donnelly Training Area* is appropriate in order to incorporate these sites. Further, we agree with the management recommendations provided, including inventory of previously unsurveyed areas and research to determine the eligibility of sites located within the BAX footprint expansion area. We look forward to receiving a proposed amended draft Programmatic Agreement (PA). Upon receipt, we will review the draft and provide any additional comments so that it may be expeditiously amended.

Thank you for the opportunity to comment. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer

JEB:sad

1-11-2012 5480 MEM BAX SDZ

FW-PA-1207

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT
1060 GAFFNEY ROAD #6000
FORT WAINWRIGHT, ALASKA 99703-6000

REPLY TO ATTENTION OF:

SEP 09 2012

RECEIVED SEP 2012 OHA

FIRST AMENDED PROGRAMMATIC AGREEMENT
BETWEEN
THE UNITED STATES DEPARTMENT OF THE ARMY
AND
THE ALASKA STATE HISTORIC PRESERVATION OFFICER
REGARDING
MONITORING AND TREATMENT PLAN OF ARCHAEOLOGICAL SITES LOCATED WITHIN THE SURFACE DANGER ZONE OF THE BATTLE AREA COMPLEX TRAINING FACILITY AT FORT WAINWRIGHT, DONNELLY TRAINING AREA

Amendment 1

WHEREAS, the original *Programmatic Agreement between the United States Department of the Army and the Alaska State Historic Preservation Officer regarding the Monitoring and Treatment Plan of Archaeological Sites located within the Surface Danger Zone (SDZ) of the Battle Area Complex (BAX) Training Facility at Fort Wainwright, Donnelly Training Area* was executed on the 5th day of February, 2010; and

WHEREAS, in 2009, the United States Department of the Army (the "Army"), acting through the United States Army Garrison Fort Wainwright (USAG FW), proposed to establish a Surface Danger Zone (SDZ) associated with the Battle Area Complex (BAX) and Combined Arms Collective Training Facility (CACTF) at Fort Wainwright's Donnelly Training Area (DTA) (hereafter referred to as "the Undertaking"); and

WHEREAS, the Undertaking originally entailed establishing 23,741 acres downrange of the BAX complex as a restricted area in order to protect human health and safety from potential stray rounds resulting from live fire exercises at the BAX; and

WHEREAS, this first amendment incorporates an additional 3,252 acres down range of the BAX which will be established in 2012 and surveyed for archaeological sites within 5 years as part of the Joint Pacific Alaska Range Complex restricted airspace expansion (a separate undertaking from the original establishment of the BAX SDZ); and

WHEREAS, this first amendment serves to incorporate the above mentioned additional acreage down range of the BAX which has been established since the original Programmatic Agreement (PA) was executed; and

WHEREAS, due to the removal of ineligible sites, this first amendment also corrects the number of archaeological sites (also known as historic properties per 36 C.F.R.§ 800) within the SDZ from the original 136 sites to 124 sites that are eligible or may be eligible for listing in the National Register of Historic Places (National Register) and identified in <u>Exhibit 2</u> hereto; and

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WHEREAS, with this first amendment, the BAX SDZ monitoring schedule will be changed to more closely match military live-fire training schedules; and

WHEREAS, being no construction will take place in the SDZ, no targets will be set up within the SDZ and no archaeological sites are within the direct line of fire; potential adverse effects to historic properties will likely be limited to impacts of stray rounds from live fire training activities at the BAX; and

WHEREAS, during the 2009 field season, the USAG FW completed the archaeological excavation of the 29 archaeological sites closest to the BAX in accordance with the research design and methods detailed in *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Section 8.0); and

WHEREAS, the USAG FW has consulted with the Alaska State Historic Preservation Officer (SHPO) pursuant to 36 C.F.R. § 800, regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470 f) and the SHPO has concurred with a finding of no adverse effect provided that a monitoring and data recovery program is implemented; and

WHEREAS, the USAG FW invited the Advisory Council on Historic Preservation (ACHP) to participate, and the Council declined; and

WHEREAS, the USAG FW consulted the FW Cultural Resources Working Group including the Tanana Yukon Historical Society; and

WHEREAS, the USAG FW consulted with Alaska Native tribes from the Village of Dot Lake, Native Village of Eagle, Healy Lake Village, Northway Village, Native Village of Tanacross, and Native Village of Tetlin; and will continue to consult during the duration of this PA; and

WHEREAS, this PA has been prepared in consultation with the SHPO and in accordance with 36 C.F.R. § 800.14 (b)(1)(v); and

NOW, THEREFORE, the USAG FW and SHPO agree that the USAG FW shall ensure that the following stipulations are implemented in order to take into account the effects of the Undertaking on historic properties and to satisfy the USAG FW's NHPA Section 106 responsibilities.

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STIPULATIONS

The USAG FW shall ensure that the following stipulations are implemented:

I. SURVEY

a. Survey: Systematic Phase I archaeological survey of all areas added to the BAX SDZ with this first amendment will take place over a period of no more than 5 years from date of execution of this amended PA. Any archaeological sites found will be added to the monitoring program. If a Determination of Eligibility (DOE) is conducted on any archaeological site within the SDZ resulting in a site being found to not be eligible for the National Register, that site will be removed from the monitoring plan once the SHPO concurs with the DOE.

b. If, in the future, the BAX SDZ is expanded beyond its current anticipated boundary up to 20% in additional area (5,400 acres), the USAG FW will notify the SHPO prior to the expansion being formalized and will develop a plan to survey the added area.

(1) Any archaeological sites found during the survey will be added to the monitoring program.

(2) Any expansion beyond the 20% of the original size of the BAX SDZ will be treated as a new undertaking.

II. MONITORING

a. Monitoring: Monitoring will be conducted in accordance with the research design and methods detailed in Exhibit 1 *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Section 7.0). Monitoring started in August of 2009, and will last for a period of no longer than 10 years, to be determined in consultation with the SHPO.

(1) All sites will be visited at least once each year.

(2) Site visits will be conducted after the completion of training episodes, up to 6 times a year provided regular use and training on BAX occurs. If no training occurs on BAX, sites will not be monitored more than once annually.

b. If monitoring activities identify adverse effects to any of the 124 known archaeological sites, or any other historic properties, located within the BAX SDZ, then the SHPO will be contacted directly via email or telephone within seven days. A report of the sites affected, as well as nature and extent of effects, will be submitted to the SHPO within 60 days. The USAG FW will then develop a plan to mitigate adverse effects to affected archaeological sites in consultation with the SHPO and interested Alaska Native tribes.

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c. If mortar full range training rounds are used in the BAX, the USAG FW Cultural Resources will help site the impact area and monitor the retrieval of rounds within the BAX SDZ[1].

III. DATA RECOVERY

Data Analysis: Data analysis of recovered materials from the 2009 fieldwork will be completed in accordance with the research design and methods detailed in *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Section 8.0).

IV. CULTURAL RESOURCE AWARENESS TRAINING

To prevent disturbance of archaeological sites by Soldiers training at the BAX range complex, as well as other Army lands in Alaska, the USAG FW will develop an educational program designed to increase soldier awareness of cultural resources on Army lands and the laws that protect these resources. This Soldier educational program will consist of three parts:

a. Updating the USAG FW Archaeological Resource Protection Act (ARPA) tri-fold handout, and ensuring that they are available to Soldiers at newcomer briefings.

b. Development of a graphical and textual display to increase Soldiers' awareness of cultural resources on the BAX SDZ and other Army lands. This display will be presented in the form of, at a minimum, one poster to be displayed at Range Control, and one interpretive panel placard to be displayed at an informational kiosk located at the BAX range.

c. Development of a Cultural Resource Awareness Powerpoint presentation to be given to Soldiers and contractors to increase knowledge of cultural resource concerns and responsible actions, and knowledge of Alaskan Native communities. The presentation will be given to relevant personnel at newcomer briefings, and prior to training or working on the BAX range. This presentation will be given throughout the duration of this PA.

V. SUBMITTALS

a. Report of Monitoring Findings: The USAG FW will submit to the SHPO, the results of monitoring on an annual basis. This will be included as part of the USAG FW Annual Cultural Resources Report.

(1) The BAX SDZ monitoring section of the annual report will include: a list of sites monitored; dates of site monitoring activities; a detailed description of the current overall site condition and integrity; a comparison of the site's current condition to past condition assessments; and photographs of the site. Reports of monitoring findings will include data obtained from the field site monitoring form detailed in *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009* (Appendix 1).

[1] Currently, USAG FW has no plans to use long range rounds. Mortar training crews plan to use short range training rounds that do not have the range to leave the BAZ construction footprint to impact the SDZ.

(2) Provided that no adverse effects occur to the sites in question as a result of use of the BAX SDZ, the FW DTA monitoring report will be submitted to the SHPO, Bureau of Land Management (BLM)[2] and interested Alaska Native tribes no later than May of the year following monitoring activities. If adverse effects are noted, they will be reported to the SHPO.

b. Report of Excavation Findings: the USAG FW will submit to the SHPO the results of the data recovery and subsequent data analysis. The following reports will be submitted:

(1) A preliminary interim report detailing the field work and initial findings will be submitted to the SHPO no later than April 2010. If data recovery extends past 2009, then an interim report will be submitted to the SHPO by the April following each year of fieldwork. Upon receipt of the documentation, the SHPO shall provide the USAG FW with review comments no later than 45 days. [Amendment 1 Update: Stipulation b.(1) is completed; Submitted to the SHPO in 2010]

(2) A final report will be submitted to the SHPO no later than June 2 years following the end of all data recovery fieldwork. Upon receipt of the documentation, the SHPO shall provide the USAG FW with review comments no later than 45 days. Final submittal, taking into consideration the SHPO comments, shall be no later than 60 days after receipt of review comments.

c. Submittal of updated the USAG FW ARPA tri-fold, poster, and placard: as each mitigation project is funded and subsequently initiated the USAG FW will provide drafts of the updated ARPA tri-fold, poster, and placard to the SHPO within two years of the execution of this PA. All products will be complete within 3 years of the execution of this PA.

(1) The SHPO shall have 30 days from hard copy receipt of each draft document to review and provide input.

(2) The USAG FW shall consider any timely input received in developing a second submittal of the draft mitigation projects within 45 days from the close of the review period.

d. All reports will be provided to the BLM cultural resources staff. Copies of the reports with redacted site location information will be sent to interested Alaska Native tribes and be made available to the public on the Army's website.

VI. INADVERTENT DISCOVERIES

a. If cultural remains are inadvertently discovered or there are inadvertent adverse effects as a result of training or other activities associated with this Undertaking, the USAG FW shall initiate consultation pursuant to 36 C.F.R. § 800.13 to resolve unforeseen the effect.

b. If any sacred objects, funerary objects, or objects of cultural patrimony are inadvertently encountered, the area will be avoided. Training will cease in the vicinity of the find, measures will be taken to protect objects, and the Cultural Resource Manager will be notified immediately so that appropriate action can be taken in order to follow regulations set forth in 43 C.F.R. § 10 Native

[2] Army Standard Operating Procedures requires exchange of information between the Army and BLM; BLM oversees third party permitting on Army lands.

American Graves Protection and Repatriation Act (NAGPRA).

c. If human remains are encountered, then the following actions will be taken:

(1) Training/work will be stopped immediately in the locality and the USAG FW, SHPO, and Alaska State Troopers (AST) shall be contacted immediately (Alaska Statutes 12.65.5);

(2) If the remains appear recent in the judgment of the anthropologist, the USAG FW shall defer to the opinion of the AST and Alaska State Medical Examiner (SME) for a determination of whether the remains are of a forensic nature and/or subject to criminal investigation;

(3) If the ethnic/cultural identity of any human remains is in question, a qualified anthropologist experienced in human remains analysis shall examine the remains. This examination will take place within 30 days of discovery;

(4) If Native American remains are encountered in the archaeological excavations, the USAG FW will follow NAGPRA regulations set forth 43 C.F.R. § 10;

(5) If the remains are not Native American and a determination is made by the AST and Alaska SME that a death investigation is not warranted, then The USAG FW, in consultation with the Alaska SME, will inform the known descendents of the deceased. If no descendents are found, then the remains shall be re-interred in a designated area.

VII. CURATION OF MATERIALS

All recovered artifacts will be curated at the University of Alaska Museum of the North in accordance with an existing Memorandum of Agreement. Data processing of artifacts will follow curation guidelines set by Department of Defense and the University of Alaska Museum of the North.

VIII. PROFESSIONAL STANDARDS

All work pursuant to this PA will be developed by or under the supervision of a person or persons meeting the minimum professional qualifications of an archaeologist as included in "Secretary of the Interior's Historic Preservation Professional Qualification Standards" (Federal Register Vol. 62, No.119, pp. 33719).

IX. DISPUTE RESOLUTION

a. Should any Signatory to this PA object to the manner in which the terms of this PA are implemented, the USAG FW shall consult with the objecting party to resolve the objection. If the USAG FW cannot resolve the objection, the following shall apply:

(1) The USAG FW shall forward all documentation concerning the dispute to the SHPO. The SHPO shall provide the USAG FW with a proposed resolution to the dispute within 30 days of

receiving adequate documentation. If the USAG FW agrees with the SHPO's resolution, then the Undertaking may proceed accordingly;

(2) If the SHPO does not provide its advice regarding the dispute within the 30 days time period, or the USAG FW and the SHPO cannot resolve the dispute, then the USAG FW shall forward all documentation relevant to the dispute, including the USAG FW's proposed resolution, to the ACHP. The ACHP shall provide the USAG FW with its advice on the resolution of the objection within 45 days of receiving adequate documentation;

(3) If the ACHP does not provide its advice regarding the dispute within the 45 days time period, the USAG FW may make a final decision on the dispute and proceed accordingly;

(4) Prior to reaching a final decision on the dispute, the USAG FW shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the SHPO, the ACHP, and Concurring Parties, and provide them with a copy of this written response.

(5) The USAG FW's responsibilities to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

b. Should any signatory to this PA object in writing to the USAG FW regarding any action carried out or proposed with respect to the implementation of this PA, the USAG FW shall consult with the objecting party. If after initiating such consultation the USAG FW determines that the objection cannot be resolved through consultation, it shall forward all documentation relevant to the objection to the ACHP, including the USAG FW's proposed response to the objection. Within thirty calendar days after receipt of all pertinent documentation, the ACHP shall provide recommendation or comment on the objection.

c. Should the ACHP not provide comment within thirty calendar days after receipt of the pertinent documentation, the USAG FW may assume the ACHP's concurrence in its proposed response to the objections.

d. The USAG FW shall take into account any the ACHP recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; the USAG FW responsibility to carry out actions under this PA not the subject of the objection shall remain unchanged.

e. At any time during implementation of any stipulation in this PA, should an objection to any such stipulation or its manner of implementation be raised by a member of the public, the USAG FW shall take the objection into account and consult as needed with the objecting party and the SHPO to address the objection.

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X. NOTICES

All notices, submissions, consents, demands, requests, or other communications which may or are required to be given hereunder to any Signatory shall be sent by (a) hand delivery (which shall be deemed to have been received upon delivery), (b) reputable overnight courier (which shall be deemed to have been received one business day after the date sent), (c) United States mail, registered or certified, return receipt requested, postage prepaid (which shall be deemed to have been received upon receipt by the sender of the return receipt), (d) facsimile, with a copy sent by reputable overnight courier (which shall be deemed to have been received when the sender receives a confirmation of successful transmission of the facsimile) or (e) electronic mail (which shall be deemed to have been received when the sender received a confirmation of successful transmission). Such documents shall be sent to the following addresses:

If to USAG FW:
Garrison Commander
U.S. Army Garrison Fort Wainwright
Fort Wainwright, AK 99703
With a copy to:

Directorate of Public Works
Attn: IMFW- PWE (CR Manager)
1060 Gaffney Road, #4500
Fort Wainwright, AK 99703-4500

If to SHPO:
State Historic Preservation Officer
Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501

XI. AMENDMENT

The USAG FW or SHPO may request that this PA be amended, whereupon they will consult in accordance with 36 C.F.R. § 800 to consider such amendment. In particular, they will consider the information developed in the USAG FW's reports under Stipulations I and II to determine if the USAG FW can effectively or efficiently carry out activities to support its mission through revisions to this PA. No amendment shall take effect until it has been executed by the USAG FW and the SHPO.

XII. TERMINATION

The USAG FW or SHPO may propose to terminate this PA by providing thirty calendar days notice to the other explaining the reasons for the proposed termination. The SHPO and USAG FW will consult during this period to seek agreement on amendments or other actions that will avoid termination. In the event of termination, the USAG FW will comply with 36 C.F.R. §800 with regard to individual undertakings covered by this PA and not completed at time of termination.

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XIII. FAILURE TO CARRY OUT AGREEMENT

In the event the USAG FW does not carry out the terms of this PA or if the ACHP determines under 36 C.F.R. § 800 that the terms of this PA are not being carried out, the USAG FW will comply with 36 C.F.R. § 800.3 through § 800.7 with regard to individual undertakings covered by this PA.

XIV. ANTI-DEFICIENCY ACT

a. All requirements set forth in this PA requiring the expenditure of the USAG FW funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. §1341). No obligation undertaken by the USAG FW under the terms of this PA will require or be interpreted to require a commitment to expend funds not obligated for a particular purpose.

b. If the USAG FW cannot perform any obligations set forth in the PA due to the unavailability of funds, the USAG FW and SHPO intend the remainder of the agreement to be executed. In the event that any obligation under the PA cannot be performed due to the unavailability of funds, the USAG FW agrees to utilize its best efforts to renegotiate the provision, and may require that the parties initiate consultation to develop an amendment to this PA when appropriate.

XV. DURATION

This PA shall become effective upon execution by the USAG FW and SHPO and shall remain in effect until terminated in accordance with Stipulation XII or 7 years after it becomes effective. If training activities on the BAX are ongoing during that time, then the USAG FW and SHPO will review and extend this PA as necessary.

EXECUTION AND IMPLEMENTATION of this Programmatic Agreement evidences that the USAG FW has satisfied its Section 106 and Section 110(f) responsibilities for this Undertaking.

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Signatories:

UNITED STATES DEPARTMENT OF THE ARMY
FORT WAINWRIGHT

By: Ronald M. Johnson
RONALD M. JOHNSON
COL, SF
Commanding

Date: 4 September 2012

ALASKA STATE HISTORIC PRESERVATION OFFICER

By: Jean M. Antonson
JUDITH E. BITTNER
Deputy State Historic Preservation Officer

Date: September 19, 2012

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Concurring Parties:

BUREAU OF LAND MANAGEMENT, CENTRAL YUKON FIELD OFFICE

By: ______________________
Name:
Title:

Date: ______________________

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Exhibit 1

Robertson, A.R.
2009 *U.S. Army Alaska's Monitoring and Data Recovery Plan for Cultural Resources within the Battle Area Complex Surface Danger Zone, Fort Wainwright, Donnelly Training Area, 2009*. Edited by E.P. Gaines. Colorado State University, Center for Environmental Management of Military Lands

[Submitted to the SHPO April 22, 2009]

Exhibit 2

2012 Adjusted site list and monitoring schedule (all ineligible sites were removed)

[Submitted to the SHPO with this PA]

SITE #	NRHP Status	Monitoring Visits
XMH-00274	Not Evaluated	Annual
XMH-00277/00879	Eligible	Annual
XMH-00278	Not Evaluated	Annual + After Training
XMH-00279/00918	Eligible	Annual + After Training
XMH-00284/00882	Eligible (excavated)	Annual
XMH-00292/00885	Eligible	Annual + After Training
XMH-00322	Not Evaluated	Annual + After Training
XMH-00323/00893	Not Evaluated	Annual + After Training
XMH-00874	Eligible (excavated)	Annual
XMH-00878/00908	Eligible	Annual + After Training
XMH-00881	Eligible	Annual
XMH-00886	Not Evaluated	Annual + After Training
XMH-00887	Eligible	Annual + After Training
XMH-00890	Eligible	Annual + After Training
XMH-00891	Eligible	Annual + After Training
XMH-00894	Not Evaluated	Annual + After Training
XMH-00902	Not Evaluated	Annual + After Training
XMH-00903	Not Evaluated	Annual + After Training
XMH-00904	Eligible	Annual + After Training
XMH-00905	Not Evaluated	Annual + After Training
XMH-00906	Not Evaluated	Annual + After Training
XMH-00907	Not Evaluated	Annual + After Training
XMH-00909	Not Evaluated	Annual + After Training
XMH-00910/00911	Not Evaluated	Annual + After Training
XMH-00913	Not Evaluated	Annual + After Training
XMH-00914	Not Evaluated	Annual + After Training
XMH-00915	Not Evaluated	Annual + After Training

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XMH-00917	Not Evaluated	Annual + After Training
XMH-00919	Not Evaluated	Annual + After Training
XMH-00920	Eligible	Annual + After Training
XMH-00921	Not Evaluated	Annual + After Training
XMH-00923/00922	Not Evaluated	Annual + After Training
XMH-00924	Not Evaluated	Annual + After Training
XMH-00925	Not Evaluated	Annual + After Training
XMH-00926	Not Evaluated	Annual + After Training
XMH-00927	Not Evaluated	Annual + After Training
XMH-00928	Not Evaluated	Annual + After Training
XMH-00929	Not Evaluated	Annual + After Training
XMH-00945	Eligible	Annual + After Training
XMH-00983	Not Evaluated	Annual
XMH-01070	Not Evaluated	Annual
XMH-01071	Not Evaluated	Annual + After Training
XMH-01074	Not Evaluated	Annual + After Training
XMH-01075	Not Evaluated	Annual + After Training
XMH-01076	Not Evaluated	Annual + After Training
XMH-01077	Not Evaluated	Annual + After Training
XMH-01078	Not Evaluated	Annual
XMH-01084	Not Evaluated	Annual
XMH-01085	Not Evaluated	Annual + After Training
XMH-01086	Not Evaluated	Annual + After Training
XMH-01087	Not Evaluated	Annual + After Training
XMH-01088	Not Evaluated	Annual + After Training
XMH-01089	Not Evaluated	Annual
XMH-01090	Not Evaluated	Annual
XMH-01091	Not Evaluated	Annual
XMH-01092	Eligible	Annual + After Training
XMH-01093	Eligible	Annual
XMH-01095/01142	Not Evaluated	Annual + After Training
XMH-01096	Not Evaluated	Annual
XMH-01097	Not Evaluated	Annual
XMH-01098	Not Evaluated	Annual
XMH-01099	Not Evaluated	Annual
XMH-01100	Not Evaluated	Annual
XMH-01104	Not Evaluated	Annual
XMH-01105	Not Evaluated	Annual
XMH-01106	Not Evaluated	Annual
XMH-01107	Eligible	Annual
XMH-01108	Not Evaluated	Annual
XMH-01109	Eligible	Annual
XMH-01110	Eligible	Annual
XMH-01111	Not Evaluated	Annual
XMH-01114	Not Evaluated	Annual
XMH-01115/01117	Eligible	Annual

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XMH-01365	Not Evaluated	Annual
XMH-01366	Not Evaluated	Annual
XMH-01367	Not Evaluated	Annual
XMH-01368	Not Evaluated	Annual
XMH-01377	Not Evaluated	Annual
XMH-01378	Not Evaluated	Annual
XMH-01384	Not Evaluated	Annual

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THE STATE
of ALASKA
GOVERNOR SEAN PARNELL

Department of Natural Resources

DIVISION OF PARKS AND OUTDOOR RECREATION
Office of History and Archaeology

550 West 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565
Web: http://dnr.alaska.gov/parks/oha
Phone: 907.269.8721
Fax: 907.269.8908

September 19, 2012

File No.: 3480 ARMY BAX SDZ

Michael T. Meeks
Director, Directorate of Public Works
Department of the Army
Headquarters, U.S. Army Garrison Fort Wainwright
1060 Gaffney Road, #6000
Fort Wainwright, Alaska 99703-6000

Subject: First Amended Programmatic Agreement Between the United States Department of the Army and the Alaska State Historic Preservation Officer Regarding Monitoring and Treatment Plan of Archaeological Sites Located within the Surface Danger Zone (SDZ) of the Battle Area Complex (BAX) Training Facility at Fort Wainwright, Donnelly Training Area

Dear Mr. Meeks:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated September 9, 2012) on September 11, 2012.

Following our review of the documentation provided, we have signed the amended Programmatic Agreement (PA) and are returning a copy with the original SHPO signature for your records. Once fully executed, we look forward to receiving a copy for our records.

Thank you for the opportunity to comment. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Joan M. Antonson

Judith E. Bittner
Deputy State Historic Preservation Officer

JEB:sad

DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

OCT 0 3 2012

Colonel Patrick O. Moylan
Vice Commander, Eleventh Air Force
9480 Pease Ave Ste 101
Joint Base Elmendorf-Richardson Alaska 99506-2101

Ms. Judith Bittner
Alaska State Historic Preservation Officer
Office of History and Archaeology
Department of Natural Resources
550 West 7th Avenue, Suite 1310
Anchorage Alaska 99501

Dear Ms. Bittner

The Alaskan Command (ALCOM) requests your concurrence with the finding of No Historic Properties Affected for the *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska* Realistic Live Ordnance Delivery (RLOD) proposed action.

Based on the nature of the proposed action, no historic properties will be affected within the Areas of Potential Effect for the Realistic Live Ordnance Delivery proposal. Pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 USC § 470), and according to the regulations governing Section 106, 36 CFR Part 800 "Protection of Historic Properties," a determination is made of No Historic Properties Affected.

Survey results are attached to support a finding of No Historic Properties Affected. The U.S. Army Garrison Fort Wainwright, Alaska will be conducting any additional Section 106 consultation necessary for the definitive projects affecting Army-managed lands.

All correspondence associated with this consultation will be included in the Administrative Record of the EIS. If you have any questions regarding the proposals or regarding this request, please feel free to contact Mr. Jamie Spell at (907) 552-1695, LTC Russell Price at (907) 552-3683, or Ms. Erin Marynak at (907) 552-3791.

Sincerely

Patrick O. Moylan

PATRICK O. MOYLAN
Colonel, USAF
Vice Commander

Attachment:
Realistic Live Ordnance Delivery Proposal Survey Results

Introduction

This document fulfills the interim reporting requirements for the Archaeological Studies for Realistic Live Ordnance Delivery (RLOD) and Battle Area Complex (BAX) portion of Contract W911KB-10-12-0001, Task Order 89, and can be used to begin Section 106 correspondence with the State Historic Preservation Officer (SHPO) for the construction and use of RLOD targets.

As part of the Joint Pacific Alaska Range Complex (JPARC), the Air Force has proposed to establish two temporary target areas in Donnelly Training Area (DTA) West.

The Section 106 of the National Historic Preservation Act (NHPA) (16 USC § 470, as amended 2000) review of the current project was conducted in August 2012. No historic properties will be affected by the undertaking. Application of the Criteria for Adverse Effect [36 CFR 800.5(a)] indicates a finding of "No Historic Properties Affected" for the RLOD target construction and use.

Project Setting and Environment

The proposed project is located on Fort Wainwright's DTA (Figure 1) south of Delta Junction, Alaska. The terrain of the area is characterized by round, even-topped, west to east oriented ridges that rise above adjacent valley floors to an elevation of 600-1500 m above sea level (masl). The surface topography has been carved by multiple glacial events and subdued further in some areas by the addition of moraine and outwash (Pink 2005). DTA lies within the Northern Foothills of the Alaska Range. The foothills are largely unglaciated, but past glaciations widened valleys and valley glaciers extend onto the installation. In the eastern portion of the training area elevation rises abruptly and steep slopes are incised by Holocene creeks and rivers.

Bedrock is primarily composed of Precambrian schist overlain by Cretaceous granites and Tertiary volcanic rocks. The volcanic rocks were an important raw material source for prehistoric peoples living in this area. Glacial moraine and alluvial outwash fans are among the most common surface sediments (Holmes 1965). The parent materials for soils in DTA are glacial and aeolian in origin, and profiles typically contain an organic layer above loess above till (Natural Resource Conservation Service 2010).

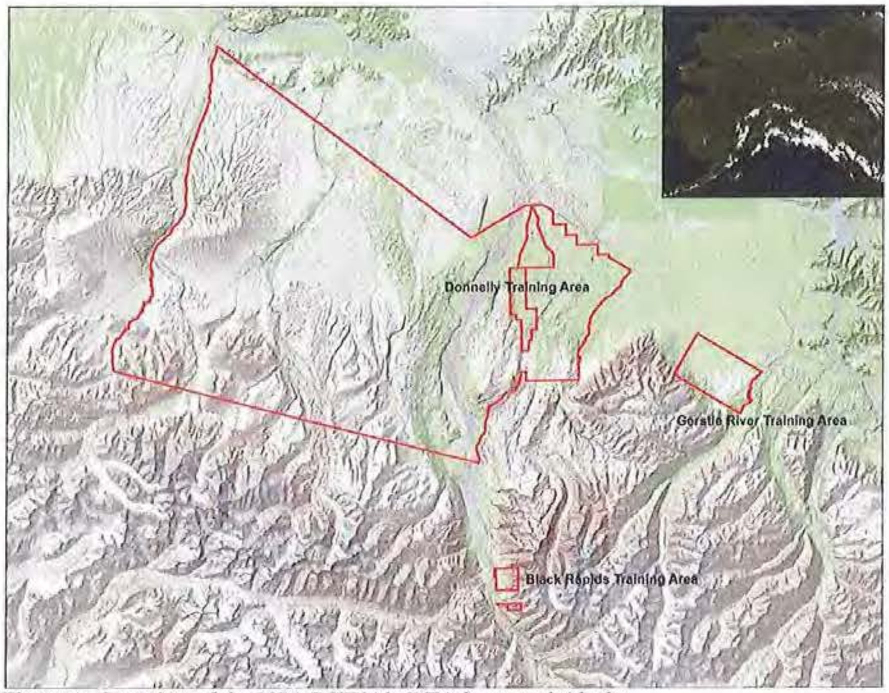

Figure 1. Location of the USAG FWA's DTA in central Alaska.

Historic Background

Prehistoric Context

Interior Alaska has been continuously inhabited for the last 14,000 years, and evidence of this continuum of human activity has been preserved within and around FWA's training lands. Interior Alaska's ice-free status during the last glacial period provided a corridor connecting the Bering Land Bridge and eastern Asia to North America. This allowed small bands of nomadic peoples to colonize Alaska and the rest of the continent and began a period of habitation in Interior Alaska that has persisted through the entire Holocene, the arrival of European traders in the late 1810s, the Klondike gold rush of the late 19th and early 20th centuries, and the military development of the Interior during the middle of the 20th century. FWA's cantonment and training lands comprise a vast and still relatively unsurveyed region with areas of high potential for yielding evidence of this activity.

Alaska has long been regarded as the gateway to the Americas and has held archaeological interest as the possible location for the oldest archaeological sites in the New World. This is due to more than Alaska's proximity to Asia and ice-free condition at the end of the Pleistocene. Similarities between archaeological assemblages in Siberia and Alaska and the discovery of lanceolate projectile points in the muck deposits around

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Fairbanks in the early 1900s (which bore a resemblance to Clovis points of some antiquity in the American Southwest) also sparked interest in Alaska as a source area for all Native Americans.

After initial colonization, archaeologists generally divide Interior Alaska's prehistory into three broad archaeological themes: the Paleoarctic Tradition (12,000-6,000 years ago[1]), the Northern Archaic Tradition (6,000-1,000 years ago), and the Athabaskan Tradition (1,300-800 years ago) (Potter 2008). Archeological materials from these cultures are generally limited to lithic artifacts such as projectile points, cutting tools, scrapers, waste flakes from tool manufacturing, faunal remains, and hearths.

Reconstructions of paleoecological evidence suggest that the end of the Pleistocene was marked by a warming trend in Interior Alaska that may have contributed to initial colonization of the area (Bigelow and Powers 2001). Several sites in areas surrounding Army lands demonstrate that people began living in Interior Alaska 14,000 years ago. Significant sites in the Tanana Valley dating between 14,000-12,000 years ago include Healy Lake (Bigelow and Powers 2001), Walker Road (Bigelow and Powers 2001), Swan Point (Bigelow and Powers 2001), Mead (Bigelow and Powers 2001), and Broken Mammoth (Bigelow and Powers 2001). There are no sites in Alaska, however, that predate the oldest sites in the contiguous United States, nor do Alaska's oldest sites resemble the Clovis culture (Bigelow and Powers 2001). The Younger Dryas cooling event from 13,000-12,000 years ago (Bigelow and Powers 2001) may have led to a temporary population decline (Potter 2008) in the Interior before permanent colonization.

The Paleoarctic Tradition is a term now generally used by archaeologists to refer to the earliest settled people known from all over Alaska. It was originally defined by Anderson[2] (Anderson 1968, 1970) as the earliest microblade-using tradition in the American Arctic, with a proposed relationship to northeast Asian late Pleistocene cultures based on similarities in these distinctive artifact types. Archaeological evidence indicates that early settlers camped on terraces, lakeshores, buttes, and bluffs. By using these locations on high ground, they could locate and track prey that included large mammals such as mammoth and bison. Evidence from the Upward Sun River Site, located just 5 km southeast of TFTA, for example, demonstrates that hunter-gatherers in Interior Alaska were concentrating on bison and wapiti at the end of the Pleistocene (The Upward Sun River Site is also known for one of the earliest burials in the Americas [Potter 2008; Potter et al. 2008; Potter et al. 2011]). It is likely that the treeless environment and nomadic nature of these peoples had a direct impact on the kinds of tools they fashioned. Stone, bone, antler, and ivory provided the most abundant material for manufacturing weapons and cutting tools. Artifacts typically associated with this culture include small stone microblades, microblade cores, bifacial projectile points, and unifacial scraping tools.

In Interior Alaska, this tradition historically included two cultural divisions called the Nenana and Denali complexes. The Nenana Complex was identified by Powers and

[1] All dates are given in calendar years *before present*.

[2] Anderson called it the "American Palaeoarctic Tradition," but most researchers use the shortened version.

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Hoffecker from sites in the Nenana Valley (Powers and Hoffecker 1989). This complex began approximately 11,000 years ago with an artifact assemblage that included triangular or teardrop-shaped, bifacially worked projectile points ("Chindadn" points [Cook 1969; 1975; Holmes and Cook 1999]); large unifacial chopper-like tools; and flake tools. The Nenana Complex is defined as lacking microblades, microblade cores, and burins, and was proposed to predate the microblade-rich Denali Complex. Many Nenana Complex archaeological sites are located in the Tanana Valley, adjacent to FWA training lands (Broken Mammoth [Holmes 1996; Yesner et al. 1999], Chugwater [Lively 1996], Donnelly Ridge [West 1967; 1996, Donnelly Ridge is located in DTA], Healy Lake [Cook 1989], Mead [Holmes 2007] and Swan Point [Holmes et al. 1996; Holmes 1998; 2007]).

The Denali Complex, dated roughly to 10,500 to 8,000 years ago, was originally defined by West (West 1967; 1975) and includes distinctive wedge-shaped microblade cores, core tablets and their derivative microblades, large blades, biconvex bifacial knives, certain end-scraper forms, and burins. West later defined the Denali Complex as a regional variant of the American Paleoarctic Tradition (West 1981). Denali sites in the vicinity of FWA's training lands include Mt. Hayes (West 1996), Swan Point (Holmes et al. 1996; Holmes 1998, 2007), and Gerstle River (Potter 2001). At least one site in TFTA (FAI-2043) has also been dated to this period.

The relationship between the proposed Nenana and Denali complexes is as of yet unresolved. As discussed above, some researchers view the Nenana Complex as a bifacial industry that predates the microblade-based Denali Complex. However, current research at sites such as Swan Point and Broken Mammoth indicates that microblades and burins were used by the earliest known cultures in Interior Alaska, with a later co-occurrence with Chindadn points—the defining artifact type of the Nenana Complex. Although some archaeologists still believe that there is a cultural distinction between the Nenana and Denali complexes (e.g., Dumond 2001), the general understanding from Interior Alaskan archaeologists is that there is a behavioral explanation for the presence or absence of microblades in different assemblages (Holmes 2001; Potter 2008; Yesner and Pearson 2002). Moreover, both Nenana and Denali technology persist in central Alaska throughout the Holocene (Bever 2006).

Site density declined in the areas around FWA in the early Holocene, suggesting a slight depopulation during a period of climate change that initiated the widespread establishment of spruce forests (Potter 2008). The boreal forest in Interior Alaska was established by 8,000 years ago (Bigelow and Powers 2001). Sites from this time period are less well publicized than the older sites, but include Houdini Creek (circa 8,600 years old), Hurricane Bluff (c. 9,800 years old), Lucky Strike (c. 8,500 years old), Gerstle River (c. 10,000 years old), and the Campus Site (c. 7,700 years old) (Pearson and Powers 2001; Potter et al. 2007; Potter 2008). Bison, wapiti, and birds were the most important subsistence game during this period (Potter 2007, 2008).

Site density increased again after about 6,000 years ago in Interior Alaska (Potter 2008). This population increase coincides roughly with the Northern Archaic Tradition and the appearance of side-notched projectile points. Anderson originally defined the

Northern Archaic Tradition to specifically address notched point-bearing stratigraphic horizons that did not contain microblades at the Onion Portage site in northern Alaska (Anderson 1968). Alaskan notched points were generally similar to Archaic-age dart points in the contiguous United States. Time has shown middle Holocene assemblages in Alaska to be quite diverse, however, and it is questionable whether this trait is related to southern forms or if it is a reliable indicator of cultural affiliation (Clark 1992; Cook and and Gillespie 1986). Artifact assemblages associated with this culture can vary but generally contain myriad tools ranging from bifacial knives and microblades to end scrapers and side-notched points. Middle Holocene hunter-gatherers had a subsistence economy focused on seasonally abundant game including caribou, fish, and moose (Potter 2008). Notched point assemblages occur in many sites in Interior Alaska, including over one dozen on Army lands (XBD-277, XMH-277, XMH-283, XMH-303, XMH-309, XMH-874, XMH-950, XMH-1130, XMH-1168, XMH-1300, Robertson et al. 2004, Raymond-Yakoubian and Robertson 2005.) Several sites (XBD-270, XMH-915, XMH-925), including the excavated Banjo Lake site in DTA (XMH-874), have also produced middle Holocene dates from hearth charcoal. The 6,300-6,700-year-old dates from Banjo Lake were also associated with a microblade component (Robertson et al. 2008).

Utilization of microblade and burin-based industries appears to continue through the middle and late Holocene in Interior Alaska (Esdale 2008; Potter 2004). By the late Holocene, archaeologists see a shift from seasonal large mammal hunting with a nomadic lifestyle to a focus on seasonally over-abundant resources, use of storage, and more permanent settlements (Potter 2008b). Artifact assemblages do not drastically change until the last millennium of the Holocene when microblades disappear from the archaeological record (Potter 2008).

Linguistic evidence suggests that the Athabaskan culture may have appeared in the Tanana Valley as early as 2,500 years ago. Through ethnography, oral history, and a broad array of cultural items, much has been learned about Athabaskan culture and history in the region. Artifacts associated with the Athabaskan culture are exceptionally diverse and include bone and antler projectile points, fishhooks, beads, buttons, birch bark trays, and bone gaming pieces. In the Upper Tanana region, copper was available and used in addition to the traditional material types to manufacture tools such as knives, projectile points, awls, ornaments, and axes (Clark 1981). A late prehistoric Athabaskan occupation is recognized at several sites in and around FWA's training lands (Andrews 1975; Andrews 1987; Cook 1989; Mishler 1986; Sheppard et al. 1991; Shinkwin 1979; Yarborough 1978). Of particular interest in this regard is a copper projectile point recently found in a buried context at DTA (XBD-272) (Robertson et al. 2009).

The Athabaskan Tradition includes late prehistoric and proto-historic cultures generally believed to be the ancestors of Athabascan tribes who currently inhabit Interior Alaska. Excavated Athabaskan sites are rare, but the limited body of evidence allows for several generalizations. Raw material usage was reorganized in the Athabaskan Tradition, which de-emphasized stone tool-making and increased the emphasis on the manufacture of items from native copper and organic materials (Dixon 1985). Assemblages include ground and pecked stone artifacts and an increased use of expedient

tools. There was a broadening and diversifying of the resource base at this time to include small mammal and freshwater marine animals such as fish and mollusks (McFadyen Clark 1981; McFadyen Clark 1996; Ream 1986; Sheppard et al. 1991; Shinkwin 1979). Athabaskan sites tend to occur in resource-rich areas near lakes, streams and rivers, and are generally characterized by large house pit and cache pit features. Proto-historic Athabaskan assemblages include Euro-American trade goods such as glass beads and iron implements. Sites of this time period reflect an increased reliance on outside trade and include log cabins co-occurring with traditional house pits, as well as a change in site location to maximize trading opportunities (Andrews 1975; Andrews 1977; Andrews 1987; McFadyen Clark 1981; VanStone and Goddard 1981).

Athabascan settlement patterns depended greatly on the availability of subsistence resources, and Interior bands lived a nomadic lifestyle. They often traversed vast areas to support themselves and spent considerable time engaged in subsistence activities. It was often necessary for bands to divide into smaller groups to find game, and preserved fish were used as a staple of the diet in addition to fresh game (Andrews 1975).

Four Athabascan linguistic and geographic groups have inhabited the Tanana Valley: the Upper Tanana, Tanacross, Tanana and Koyukon. Each group is further distinguished according to geographic location. Bands of the Tanana and Tanacross groups are historically associated with the geographic area that embodies Forts Wainwright and Greely. Salcha, Chena, Wood River, Goodpaster, and Healy Lake bands have inhabited the region since protohistoric times and possibly even prehistoric times (Andrews 1975). Use of the region varied from one band to the next. The Salcha, Chena, Goodpaster, and Wood River bands of the Tanana Athabascans and the Healy Lake band of the Tanacross Athabascans used certain parts of what are now Forts Wainwright and Greely (McKennan 1981). Several villages have been reported on or near FWA. One occupied by the Wood River band is said to have been located in the southern part of FWA but has not been found (Dixon 1980; Reynolds 1986). The Blair Lakes Archaeological District (FAI-335) on FWA may relate to the prehistory of the Athabaskan Tradition. Euro-American historic archaeological sites are also present (Gamza 1995; Phillips 1984).

Historic Context

With the beginning of Euro-American contact in Interior Alaska in the early 19th century, trade influences and influxes of new populations began to change life in the region. Land use patterns shifted from traditional indigenous uses to activities based on Euro-American economic and political systems. FWA's training lands fall within an area occupied at the time of Euro-American contact by Lower-Middle Tanana Athabascans, including bands described generally as the Salcha, Big Delta-Goodpaster, Wood River, and Chena bands (McKennan 1981; Andrews 1975; Mishler 1986). Historical accounts document traditional settlement patterns that were focused on a widely mobile season round, with the fall caribou hunt playing a pivotal role in subsistence preparations for the winter and summer activities focused at fish camps, berry and root collecting, and in sheep hunting. These activities were frequently communal, with several local bands connected by common interest, geography, and intermarriage. Despite anthropological attempts to define boundaries for the peoples living in the lower Tanana River Valley,

natural terrain served as the only definable boundary to settlement patterns (McKennan 1981).

As Euro-American traders, miners, missionaries, and explorers moved into the Tanana River Valley, the traditional life ways of local Athabascan groups were disrupted. Access to trade goods and the development of the fur trade not only affected traditional material culture, but also began to dramatically affect subsistence activities and settlement patterns. Similarly, the arrival of missionaries in the Alaskan Interior profoundly influenced traditional social organization. The introduction of mission schools for Native children and the doctrine of new religious beliefs contributed to an erosion of traditional practices (McKennan 1981).

Russian fur traders began settling Interior Alaska starting in the 1810s, establishing a post at Nulato on the Yukon River and one at Taral on the Copper River. British traders established Fort Yukon in 1847. Trade goods from these posts may have passed to Tanana Athabascans and Upper Tanana Athabascans through intra-Native trade networks. Direct contact between Tanana Athabascans and white traders increased after the 1860s. With the U.S. purchase of Alaska in 1867, control of trading stations and the fur trade passed to Americans. Through the 1880s, American traders established several additional posts on the Yukon and Tanana Rivers, including locations at Nuklukayet (modern day Tanana), Belle Isle (modern day Eagle), and Fort Yukon.

Trade goods introduced by Euro-American settlers influenced the Native lifestyle. Clothing, staples, tools, and other necessities could be obtained through trade. Guns allowed hunters to obtain game with greater efficiency. Gradually, Athabascan Native groups began to alter their traditional nomadic patterns in favor of more permanent settlements. However, while significant, this contact would not have as dramatic an impact on the region as the discovery of gold in the Interior during the last decades of the 19th century. The towns established by Euro-American settlers at the turn of the 20th century, in response to the Klondike Gold Rush and the eventual military development of the region, would rapidly and permanently change the demography and economy of Interior Alaska.

Gold strikes in the Fortymile River region, Birch Creek area, and the Canadian Klondike began drawing miners and prospectors north in the 1880s and 1890s. In response to this gold rush, E.T. Barnette established a trading post on the Chena River in 1901. The following year, prospector Felix Pedro discovered gold nearby, and a new gold rush soon led to the founding of Fairbanks at the site of Barnette's original trading post. Most mining activities in the region occurred on creeks north of Fairbanks, with the town serving as a supply center. Agricultural and other commercial activities, such as logging, also developed to support mining activities in the Fairbanks area. Homesteads existed on parts of what is today the main post of FWA as early as 1904.

In 1898, the discovery of gold in the Tanana uplands began a rush of Euro-American settlement into the Tanana River Valley. As the economic importance of the Tanana Valley increased, the need for reliable transportation routes and communication systems rose in tandem. Existing trails, such as the Bonnifield, Donnelly-Washburn, and Valdez-

Fairbanks trails, saw increased use and development in the first decade of the 20th century. This increase in activity also resulted in the establishment of several roadhouses and posts. In 1906, Congressional appropriations led to improvement of the Valdez-Fairbanks Trail, crossing the Alaska Range south of Delta Junction, following the Tanana River to Fairbanks. Completion of the Alaska Railroad in 1923 was followed two decades later by construction of the Alaska Highway in 1942, firmly tying the Alaskan Interior to the outside.

As Fairbanks grew in the first decade of the 20th century, several agricultural homesteads were developed on lands now encompassed by sections of the FWA cantonment. These homesteads provided Fairbanks with a variety of agricultural products and wood for fuel, but were subsumed when lands were withdrawn for the creation of Ladd Field, which later became FWA (Price 2002).

Riverboats were the primary means of getting people and supplies into the Interior at the turn of the 20th century. The Fairbanks town site was located at the upper limit of navigation for stern-wheeler riverboats on the Chena River. Upriver from that point, residents navigated the river using shallow-draft boats in summer and sleds in winter. As commerce in the area increased, roads and trails were constructed, sometimes following earlier indigenous routes. The major overland route to the coast was the Valdez-Fairbanks Trail, which began as a military trail from Valdez to Eagle in 1899.

Transportation and communication networks, including the Alaska Railroad, were developed to serve new settlements in Interior Alaska. A branch of the railroad route was extended to Fairbanks in 1904. Roadhouses along the route catered to travelers. Some were located on what are now Fort Wainwright training lands. One property was on the Bonnifield Trail in TFTA, and two roadhouses and a seasonal tent operation existed along the Donnelly-Washburn Trail in the current Donnelly Training Area. Secondary routes connected Fairbanks to the surrounding mining districts.

By 1910, most of the easily accessible placer gold deposits were exhausted, and capital-intensive technologies became necessary to extract remaining deposits. These methods were not possible with the existing transportation infrastructure. The completion of the Alaska Railroad in 1923 expanded transportation options for the region, connecting Fairbanks to Seward and making large-scale dredging operations economically feasible. Aviation also became a key component of Interior transportation, beginning in earnest in the 1920s. However, it was not until 1931 that Weeks Field, originally constructed in 1923, was officially dedicated as an airfield. Industrialized corporate activity became the hallmark of the region's mining in the remaining years before World War II.

Development in the Alaskan Interior increased dramatically with the advent of World War II and subsequent military build-up in Alaska. Of particular significance was the development of airfields near Delta Junction (Fort Greely), Fairbanks (Ladd Field, later FWA), and North Pole (Eielson Air Force Base). These locations began as Lend-Lease bases and cold weather testing centers, but soon expanded with the increased need for military support during World War II and later during the Cold War.

Full historic contexts of early mining, transportation, and homesteads on FWA have been completed. These studies have determined that there are no properties eligible for the National Register under these contexts. Several village sites associated with the early contact period have been reported near FWA. One was reported near Wood River Buttes, two just northwest of the installation's boundary and one near Fairbanks (Reynolds 1986). None have been reported or located on the Main Post.

Status of Archaeological Resources

Archaeological research on FWA training areas has resulted in numerous technical reports (Bacon 1979; Bacon and Holmes 1979; Dixon et al. 1980; Esdale and Robertson 2007; Espenshade 2010; Bradley et al. 1973; Gaines 2009; Gaines et al. 2010, 2010; Hedman et al. 2003; Higgs et al. 1999; Holmes 1979; Johnson and Bozarth 2008; Marshal 2007; Potter 2005; Potter et al. 2000; Rabich and Reger 1978; Raymond-Yakoubian 2006; Raymond-Yakoubian and Robertson 2005; Robertson 2010; Robertson et al. 2004, 2006, 2007, 2008, 2009; Staley 1993) and several scientific papers (Holmes and Anderson 1986; West 1967, 1975).

FWA and its training lands contain 636 known archaeological sites and 4 archaeological districts. Sixty sites are eligible for the National Register of Historic Places (NRHP), 512 sites have not been evaluated, and 64 additional sites have been determined ineligible for the NRHP. Of the eligible or un-evaluated sites, 12 are historic sites and 560 are prehistoric sites.

Archaeological surveys of the FWA main post area began in 1979. Jim Dixon surveyed the north side of the Chena River and Birch Hill area, discovering and relocating several prehistoric archaeological sites (FAI-40, 41, 42, 43, 199, and 200) (Dixon et al. 1980). Surveys of the main post building areas continued in the 1980s by Julia Steele (Steele 1992, 1983) and Georgeanne Reynolds (Reynolds 1983, 1985). No sites were found in these previously disturbed areas. John Cook surveyed the River Road pond in 1996 and found one site (FAI-509), which has failed to be relocated in subsequent attempts. In 2001, the Army began partnering cultural resource surveys and evaluations with Colorado State University's Center for Environmental Management of Military Lands (CEMML). Surveys by several different principal investigators have targeted areas of construction undertakings. Two historic sites (FAI-1603 and 1604) and one additional prehistoric site (FAI-1990) were found in these investigations. In 2011, CEMML completed survey of the entire cantonment, north and south of the Chena River, discovering one additional historic site (FAI-2117). Of the 11 archaeological sites known from the FWA cantonment, 2 (FAI-1603 and 1604) have been determined not eligible. The remaining sites have not yet been evaluated.

Archaeological sites were first identified in the Tanana Flats Training Area (TFTA) in 1973 by Zorro Bradley and others who conducted a survey in the Blair Lakes area (Bradley et al. 1973). James Dixon continued surveys for archaeological district designations in the regions of Blair Lakes (District FAI-335), Clear Creek Butte (District FAI-336), and Wood River Buttes (District FAI-337) (Dixon et al. 1980). In 1993, proposed work in the Clear Creek Butte area prompted a contract to relocate several

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archaeological sites (Staley 1993.) These three districts have been revisited by CEMML archaeologists a few times over the last decade, and notably 92 new sites were found in 2009-2010 during survey of the Wood River Buttes, Salmon Loaf, and north and east of Blair Lakes. In total, archaeologists have identified 147 archaeological sites in TFTA. Of these sites, 11 have been determined eligible for inclusion in the National Register (FAI-44, 45, 46, 48, 49, 54, and 194 to 198), 2 are not eligible (FAI-1607 and 2046), and 134 remain to be evaluated for eligibility.

The road system in the Yukon Training Area (YTA) was the first of many areas to be investigated. Charles Holmes discovered eight sites in a 1978 road survey (Holmes 1979). John Cook conducted a Determination of Eligibility (DOE) evaluation on one of these sites in 1979 (Cook 1979.) Michael Kunz surveyed the Stuart Creek area in 1992 but discovered no archaeological sites, and Northern Land Use Research's 1999 survey of Stuart Creek and the YTA road system uncovered one historic site (Higgs et al. 1999). CEMML archaeologists have been surveying portions of YTA in conjunction with construction projects on an annual basis since 2001. Currently, North Beaver Creek, Skyline, Johnson, Quarry, Brigadier, and Manchu roads in YTA are almost entirely surveyed, as is the area east of Skyline Road outside of the Stuart Creek Impact Area, McMahon Trench, the Manchu Range, and the majority of Training Areas 307 and 310, north and south of Manchu and Quarry roads. Twenty archaeological sites have been identified in YTA. Ten of the sites have been determined not eligible for listing in the National Register (FAI-157, XBD-93, 94, 95, 103, 104, 186, 260, 264, and 266) and ten have not been evaluated. XBD-162 will not be evaluated due to its location in a heavily used portion of the Stuart Creek Impact Area.

Archaeological investigations in what is now the DTA began in the 1960s, when Frederick West was searching for sites related to the first Americans (West 1967). He excavated the Donnelly Ridge site (XMH-5) in 1964 and found an assemblage containing microblade core technology similar to early Holocene Denali Complex sites. Several surveys of Ft. Greely and adjacent training lands in the late 1970s documented 64 new sites (Rabich and Reger 1977, Bacon 1979; Holmes 1979; Bacon and Holmes 1979). Julia Steele surveyed various locations in DTA from 1980-1983, finding four additional new sites (Steele 1980, 1980, 1982, 1982, 1983, and 1983), and Georgianne Reynolds surveyed the Donnelly Dome area in 1988, locating one more (Reynolds 1988). Investigations in DTA from 1992-2002 were by D. Staley (Staley 1993), T. Gamza (Gamza 1995), A. Higgs (Higgs et al. 1999), and D. Odess (Odess 2002). Sixteen new sites were found during this decade of fieldwork and attempts were made to relocate old sites.

Concentrated efforts to expand survey coverage of DTA East began with CEMML archaeologists in 2002. Over 200 new sites were located in the Texas Range, Donnelly Drop Zone, and Eddy Drop Zone in the first half of the decade. In 2007, one site was found in the northernmost portion of DTA West by Ben Potter and others during survey for the Alaska Railroad Northern Rail Extension Project (Potter et al. 2007). In recent years, CEMML research aimed to evaluate many known archaeological sites in DTA for inclusion in the National Register in conjunction with use of the Battle Area Complex and its surface danger zone. Sites have also been discovered during surveys for road and

trail maintenance. Potential expansions into DTA West, west of the Delta River, have prompted recent surveys into new areas such as Molybdenum Ridge, where 21 new sites were discovered in 2011. Because of its remote setting, however, the archaeology of Donnelly West is still poorly understood and represents a gap in USAG FWA's inventory of cultural properties. The Cold Regions Test Center (CRTC) has also contracted with CEMML and others since the last ICRMP to survey areas in DTA West, east of the Little Delta River, and many new archaeological sites have been recorded (Espenshade 2010).

To date, 455 archaeological sites have been identified within DTA. Forty-nine sites have been found to be eligible for the National Register, and 50 were found not eligible. An additional 356 sites remain to be evaluated. Historic archaeology sites are poorly represented in this region, with only six currently known to exist. The Donnelly Ridge District (XMH-388) encompasses Denali sites identified by Frederick West, south and west of Donnelly Dome. Future archaeological studies in DTA will concentrate on completing survey of 100% of the land in DTA East, conducting DOEs on archaeological sites in high traffic areas, and exploring parts of DTA West that are opening up for expansion of military training activities.

Despite its incomplete nature, the archaeological record known from DTA represents all of the currently recognized prehistoric cultures of the Alaskan Interior. Of significance is the role played by sites located on DTA in the definition of the Denali Complex of the American Paleoarctic Tradition (Anderson 1970; West 1967, 1981). The oldest date for human habitation at DTA is roughly 10,100 years at site XBD-00167 (Higgs et al. 1999); however, undisturbed stratigraphic deposits 12,800-12,930 years old indicate the potential for intact archaeological occupations of this age. Sites yielding Northern Archaic side-notched points are common (Robertson et al. 2004, 2005; Raymond-Yakoubian and Robertson 2005). At DTA, site XMH-874 yielded an AMS date of 5720 +/- 50 BP from hearth charcoal associated with a microblade component (Robertson et al. 2008). A late prehistoric Athabaskan occupation is recognized at several sites (e.g. Andrews 1975, 1987; Cook 1989; Mishler 1986; Sheppard et al. 1991; Shinkwin 1979; Yarborough 1978). Of particular interest in this regard is a copper projectile point recently found in a buried context at DTA at site XBD-00272 (Roberston et al. 2009). Euro-American historic archaeological sites are also present (Gamza 1995; Phillips 1984).

The Gerstle River and Black Rapids Training Areas (GRTA and BRTA), also managed by FWA, have been infrequently utilized for training activities, and very few surveys or identification of archaeological sites have occurred in these areas. CEMML archaeologists surveyed two small portions of GRTA in 2011. One prehistoric site (XMH-1359) is previously known from this training area. Two sites, which have not been evaluated for the NRHP, have been discovered in BRTA (XMH-317, 318). Future research is planned for GRTA where military activities are planned to take place in the next five years.

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Description of Undertaking (36 CFR 800.11 (d) (1))

In order to facilitate realistic live ordnance delivery training for pilots, the Air Force has proposed to establish two targets locations for inert ordnance dropping events outside of established impact areas in DTA West. Temporary targets (such as conex containers) would be placed at two locations with little to no ground disturbance (Figure 2).

Specifically under this proposal, the Air Force would establish:

- A new target area in northeast Donnelly Training Area (DTA) in Training Area (TA) 544 for new run-in headings, release points, and hazard zones from Joint Base Elmendorf-Richardson (JBER) to the south
- A new target area in southwest DTA in TA 533 for new run-in headings, release points, and hazard zones from Eielson AFB from the north.

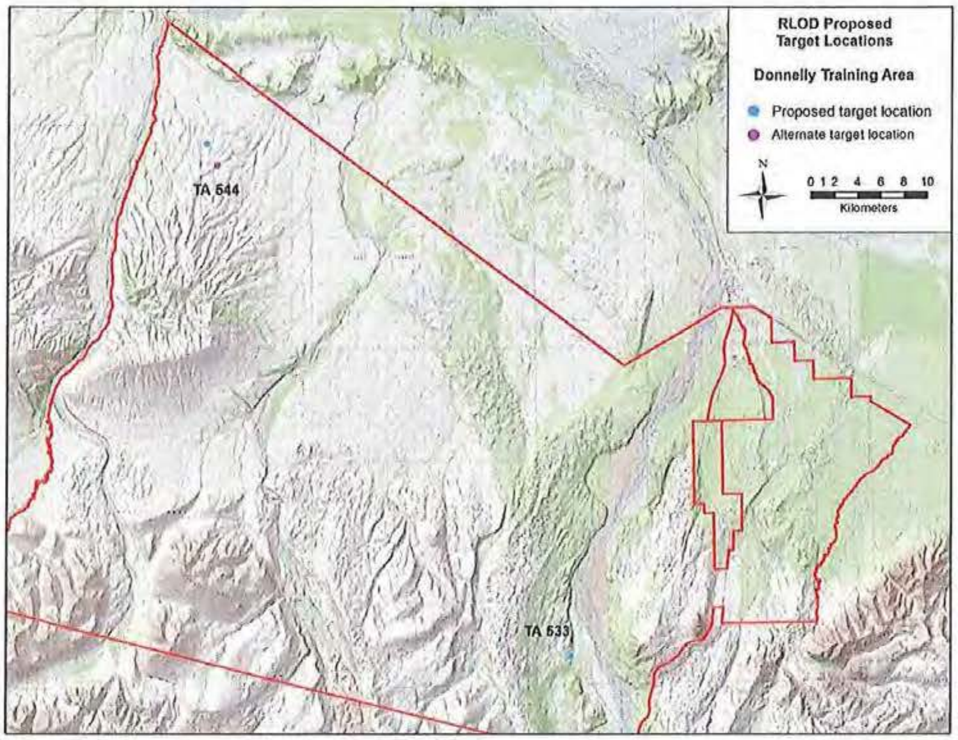

Figure 2. Proposed target locations in DTA West.

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Steps Taken to Identify Historic Properties (36 CFR 800.11 (d) (2))

Archaeological surveys of the two proposed target locations were conducted by CEMML on 16 July 2012. Helicopter survey identified non-wetland localities in the vicinity of the target locations. The proposed target area, 64°09'23.39"N 146°39'01.73'W, in TA544 had wetland and black spruce (Figure 3). The closest non-wetland locality to this site, 64°08'27.71", 146°37'49.64"W, is represented by the purple dot in Figure 2. This preferred location was a spruce covered knoll above the wetland areas (Figure 4). Pedestrian surface survey covered a 50 m diameter area of potential effect (APE) around the coordinate location. Two shovel tests were excavated. No cultural material was discovered.

The proposed target location in TA 533, 63°45'31.35"N 146°01'00.72", is a high river terrace not inundated by wetland vegetation (Figure 5). A pedestrian surface survey covered a 50 m diameter APE around this coordinate. Two shovel tests were excavated in a birch and alder-treed area (Figure 6). No cultural material was discovered.

Figure 3. Proposed TA 544 target area.

Figure 4. Preferred TA 544 target area.

Figure 5. Proposed TA 533 target area.

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Figure 6. Shovel test location in TA 533.

Only two archaeological sites are known from within 5 km of either of the target locations (Figure 7). Both are located in TA 533 near the southern target. XMH-00018 is an isolated artifact found on the north slope of a hill overlooking Jarvis Creek. It was originally discovered by Frederick Hadleigh West in 1967 and the site has not been reevaluated since that time. It is located across the Delta River from the proposed target location and would not be impacted by construction associated with this undertaking. XMH-00238 consists of a single chert flake found by Charles Holmes in 1979 on the top of a glacial moraine knoll west of the Delta River. Test pits in the vicinity of the flake encountered no other cultural material. Neither of the sites have had further evaluations for the NHRP, but they are both isolated finds and located far from the project areas.

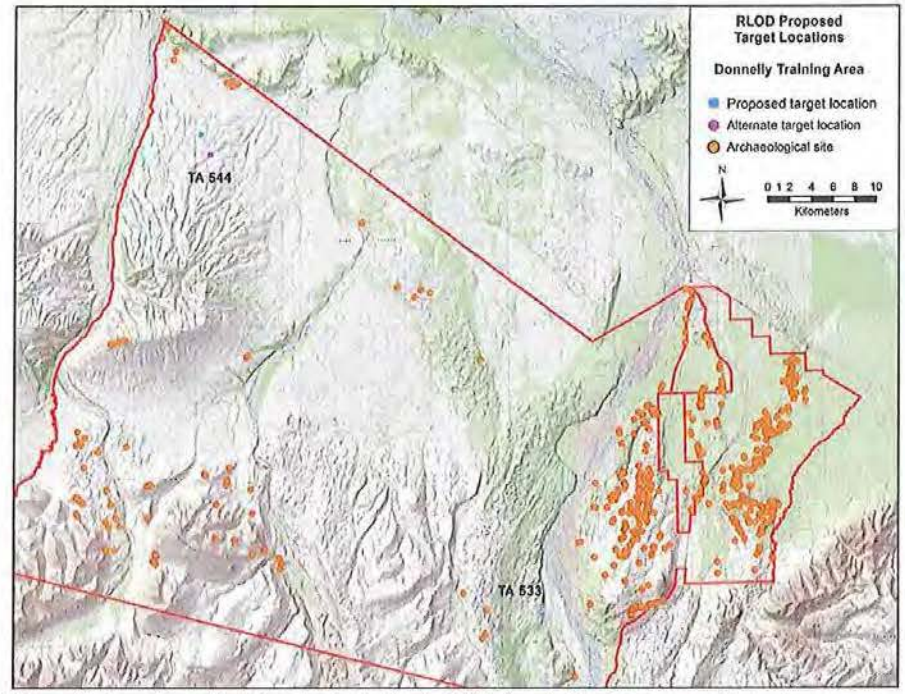

Figure 7. Location of archaeological sites in DTA in relation to proposed target areas.

Determination of Effect (36 CFR 800.11 (d) (3)) - No Historic Properties Affected

No archaeological sites were discovered during pedestrian survey and shovel testing in DTA West for RLOD target construction. Therefore, there is no reason to believe that this project warrants any further fieldwork or consideration under Section 106 of the NHPA (16 USC § 470, as amended 2000), and regulations codified in 36 CFR 800 (as amended 2004). The Air Force has determined a finding of **No Historic Properties Affected** for the RLOD target undertaking.

Copies of this letter will be sent to federally recognized tribes (Village of Dot Lake, Native Village of Eagle, Healy Lake Village, Nenana Native Association, Northway Village, Native Village of Tanacross, and Native Village of Tetlin). If you have any questions or require additional information, please contact Julie Esdale, USAG FWA Archaeologist at (907) 361-9405 or at julie.a.esdale.ctr@mail.mil.

Sincerely,

Patrick O. Moylan

16

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10.5.2012 3130-1R AIR FORCE

DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

OCT 0 3 2012

Colonel Patrick O. Moylan
Vice Commander, Eleventh Air Force
9480 Pease Ave Ste 101
Joint Base Elmendorf-Richardson Alaska 99506-2101

RECEIVED
OCT 04 2012
OHA

Ms. Judith Bittner
Alaska State Historic Preservation Officer
Office of History and Archaeology
Department of Natural Resources
550 West 7th Avenue, Suite 1310
Anchorage Alaska 99501

No Historic Properties Affected
Alaska State Historic Preservation Officer
Date. 10.5.2012
File No. 3130-1R AIR FORCE

Dear Ms. Bittner

The Alaskan Command (ALCOM) requests your concurrence with the finding of No Historic Properties Affected for the *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska* Realistic Live Ordnance Delivery (RLOD) proposed action.

Based on the nature of the proposed action, no historic properties will be affected within the Areas of Potential Effect for the Realistic Live Ordnance Delivery proposal. Pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 USC § 470), and according to the regulations governing Section 106, 36 CFR Part 800 "Protection of Historic Properties," a determination is made of No Historic Properties Affected.

Survey results are attached to support a finding of No Historic Properties Affected. The U.S. Army Garrison Fort Wainwright, Alaska will be conducting any additional Section 106 consultation necessary for the definitive projects affecting Army-managed lands.

All correspondence associated with this consultation will be included in the Administrative Record of the EIS. If you have any questions regarding the proposals or regarding this request, please feel free to contact Mr. Jamie Spell at (907) 552-1695, LTC Russell Price at (907) 552-3683, or Ms. Erin Marynak at (907) 552-3791.

Sincerely

Patrick O. Moylan
PATRICK O. MOYLAN
Colonel, USAF
Vice Commander

Attachment:
Realistic Live Ordnance Delivery Proposal Survey Results

L.5 OTHER FEDERAL AGENCIES

L.5.1 Department of Interior, Bureau of Land Management

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7504
http://www.blm.gov/ak

TAKE PRIDE IN AMERICA

FEB 10 2011

In Reply Refer To:
1610 (930)

Lieutenant General Dana T. Atkins, USAF
Commander, Alaskan Command
9480 Pease Avenue, Suite 110
Joint Base Elmendorf-Richardson, AK 99506-2101

Dear General Atkins:

On December 10, 2010, you sent notice of your intent to prepare an Environmental Impact Statement evaluating proposed modernizing and enhancing of current military ground and air training assets in Alaska. Based on the information in your document, "Joint Pacific Alaska Range Complex: Description of Proposed Action and Alternatives" dated October 2010, we decline your invitation to be a Cooperating Agency. The Bureau of Land Management (BLM) does not have a permitting, authorizing or financing role for any of the actions proposed in the alternatives presented during scoping. If the actions in the alternatives are modified where the BLM would have a permitting, authorizing or financing role, we would like to reconsider your cooperating agency invitation.

Your proposed expansion of Military Operation Areas (Fox and Paxson) does cover areas within the BLM-Glennallen Field Office. In particular, the Delta Range Special Recreation Management Area, and the Delta and Gulkana Wild and Scenic River corridors.

Under agreement with the U.S. Army, the BLM-Alaska Fire Service does provide wildland fire and vegetative management services within the proposed area. We do ask that you continue to honor those current notification and coordination protocols and that any existing mitigation measures will remain.

The BLM-Alaska Fire Service and Glenallen Field Office will provide you with more detailed comments on-line, as requested in your scoping letter. If you have questions regarding this response, please contact Callie Webber, Acting Supervisory Planning and Environmental Coordinator, at 907-271-3167.

Sincerely,

Julia Dougan

Bud C. Cribley
State Director

cc:
Deputy State Director, Division of Resources (AK930)
Anchorage District Manager (AK000)
Glennallen Field Manager (AK020)
Fire Management Officer, Alaska Fire Service (AK9F0)

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

OFFICE OF THE ASSISTANT SECRETARY

FEB 1 6 2011

SAF/IEI
1665 Air Force Pentagon
Washington, DC 20330-1665

Mr. Bud C. Cribley
State Director, U.S. Bureau of Land Management
Alaska State Office
222 West 7th Ave., #13
Anchorage, Alaska 99513-7504

Dear Mr. Cribley:

The Air Force and the Army jointly request your formal participation in the preparation of an Environmental Impact Statement (EIS) for the Joint Pacific Alaska Range Complex (JPARC) as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR § 1501.6 *Cooperating Agencies*.

As the lead agencies for the JPARC EIS, the Air Force and the Army request you participate in various portions of the EIS development as may be required. Specifically the Air Force and the Army ask for your support as a Cooperating Agency by:

a. Participating in the scoping process

b. Assuming responsibility, upon request by the Army and Air Force, for developing information and preparing analyses on issues for which you have special expertise

c. Making staff available for interdisciplinary review

To avoid unnecessary delays in the NEPA process, the Air Force and the Army will provide appropriate information and related materials in a timely fashion to enable your agency to complete its review and respond promptly. Should you or your staff have any questions regarding this letter, our point of contact is Mr. Jamie Spell, Alaskan Command, Staff Engineer, (907) 552-1695.

Sincerely,

Kathleen I. Ferguson

KATHLEEN I. FERGUSON, P.E.
Deputy Assistant Secretary of the Air Force
(Installations)

cc:
SAF/IEE
SAF/GCN
HQ USAF/A7C
HQ USAF/A3O
HQ PACAF/A7PI
ALCOM/J42

2

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Glennallen Field Office
P.O. Box 147
Glennallen, Alaska 99588
www.blm.gov/ak/st/en/fo/gdo.html

TAKE PRIDE IN AMERICA

In Reply Refer To:
1793, 2330 (AKA020)

MAR - 3 2011

ALCOM Public Affairs
9480 Pease Avenue, Suite 120
JBER, Alaska 99506

RE: JPARC EIS Scoping

Dear Planner,

The Bureau of Land Management Glennallen Field Office (BLM-GFO) has land and resource management responsibilities for federally managed lands that are encompassed by the Proposed Fox 3, 4, 5, and 6 MOAs and the Proposed Paxson MOA. In review of past documentation of the Fox 3 and proposed Fox MOA areas and plans, and of current proposals as well as our office's recreation and subsistence use data, management plans and objectives and current resource and land management issues and objectives, our office would like to make the following comments during the Joint Pacific Alaska Range Complex Environmental Impact Statement (EIS) Scoping Period:

BLM-GFO Planning Documents:
Enclosed you will find BLM-GFO planning documents that have been completed or that are underway and share some of the same planning areas as this current JPARC EIS. Each of these BLM plans has had considerable public involvement and will be helpful to you in recognizing sensitive areas for recreation, wildlife, and subsistence. The East Alaska Proposed Resource Management Plan and Final EIS completed in 2006 and the subsequent East Alaska Resource Management Plan Record of Decision (ROD) and Approved Plan completed in 2007 guide BLM-GFO management actions and objectives. The BLM-GFO would especially like to point out the following maps in the East Alaska ROD which have overlapping areas to the Fox 3, 4, 5, 6, and Paxson Proposed MOAs: Map 3 on page 65 identifies moose habitat; Map 9 on page 71 shows the extent of the Delta River Special Recreation Management Area; Map 10 on page 72 shows the extent of the Gulkana River Special Recreation Management Area(SRMA); Map 13 on page 75 shows the extent of the Delta Range SRMA; Map 15 on page 77 shows designated trails within the Delta River SRMA; Map 16 on page 78 shows designated trails within the

Gulkana River SRMA; And, Map 17 documents the Visual Resource Management Classes for the entire BLM Glennallen Field Office Management Area. The BLM-GFO would also like to point out the following maps in the East Alaska Resource Management Plan Final EIS that provide important scoping background for the JPARC plan within the BLM-GFO management boundary: Map 27 on page 189 shows GPSed Trials, ANCSA 17b Easements, and State-recognized RS 2477 travel routes which have documented public use; Map 28 on page 197 shows State of Alaska Game Management Units; Map 29 on page 205 demonstrates Recreation Opportunity Spectrums within the East Alaska planning area which demonstrates the types of recreation experiences visitors expect to have for different management areas; Map 32 on page 239 shows Black and Grizzly Bear habitat; Map 33 on page 241 shows the Bison calving area; Map 34 on page 243 shows Caribou summer and winter habitat and calving areas; Map 35 on page 245 shows Dall Sheep habitat; Map 36 on page 247 shows Mountain Goat habitat; Map 37 on page 249 shows Moose habitat; Map 38 on page 255 shows Bald Eagle breeding and nesting habitat; Map 41 on page 269 shows Trumpeter Swan nesting sites; and Map 42 on page 275 shows anadromous rivers and streams; These maps and the entire East Alaska RMP Record of Decision provides the background and general basis for the BLM Glennallen Field Office's scoping comments.

Wild and Scenic Rivers:
Enclosed you will also find a copy of the Gulkana National Wild River Record of Decision completed in 2006 and the latest draft of the Delta Wild and Scenic River Resource Management Plan. These documents further guide management actions and objectives for the BLM Glennallen Field Office within the nationally recognized wild and scenic river corridors and provide additional background within the Proposed Fox 3, 4, 5, 6 and Paxson MOAs.

The proposals to expand the FOX 3 MOA and create the new Paxson MOA would likely have a negative effect on opportunities for solitude on both the Delta and Gulkana Wild and Scenic Rivers (WSR). The BLM-GFO rivers program has documented numerous encounters with military overflights over the years. These encounters have included low level overflights on the Upper Tangles and Delta River; sometimes these encounters have included shockwaves and deafening noise that is associated with aircraft breaking the sound barrier. See attached reports labeled "Over flights 2007" and "Over flights 2000." Low level military over flights have been an issue over the river corridors for a number of years. The BLM-GFO has consulted with the United States Air Force to discuss this issue. Upon concerns raised by the BLM-GFO, the existing Fox 3 MOA boundaries were modified in 1997 to avoid the Delta WSR corridor, currently being situated on the western side of the river.

At this point in time, the existing situation is as follows:
"In 1997, the Federal Aviation Administration and United States Air Force, after conducting an Environmental Impact Statement, issued a Record of Decision that, in part, modified the boundaries of the Fox Military Operations Area (MOA) to exclude the DWSR corridor. A MOA is a Special Use Airspace designated for non-hazardous military flight activities such as air combat tactics, transition, formation training, and aerobatics. The new boundaries of the FOX MOA were situated on the western boundary of the Delta River, and include portions of the Denali Highway to the west of the river corridor. The average daily military aircraft operations in the Fox MOA is estimated to be 16 aircraft operations per day in a routine flying day and up to 80 aircraft operations per day during specialized training."

With the proposed changes to the FOX 3 MOA and the extension of the Proposed Paxson MOA, the entire Delta and Gulkana WSR corridors would be open to military overflight maneuvers. It appears through reading the JPARC scoping notices and planning newsletter dated 12.03.10 that the flight ceiling would be lowered to 500 AGL, from 5000 AGL, and that the number of sorties would increase. A lower flight ceiling level and additional sorties per day would affect opportunities for solitude. Visitor use on both rivers occurs primarily during the summer months (June-October). Outside of these months, very few users would be affected. Total summer visitors for the Delta River and Upper Tangles are approximately 1,426 visitors. Total summer visitors for the Gulkana River are approximately 3,606 visitors.

The BLM-GFO would like to work with JPARC to find mitigation measures to address this issue. Possible mitigation measures might include a request to reduce the number of sorties from June-October, not reducing the flight ceiling to 500 feet, creating a buffer zone that extends 5 miles around both river corridors, and discussions to reduce sound barrier disruptions in the vicinity of the river corridors.

BLM-GFO Campgrounds:
The Proposed Fox 3 and Paxson MOA expansion is not a compatible use with our nationally designated recreation areas and federal campgrounds. These proposals would have an adverse effect on our visiting public during high visitation months. The current Fox 3 MOA was arrived at through negotiation and compromise to provide ALCOM with the middle of the Denali Highway. Current overflights at 5,000 AGL cause a disturbance to the recreating public. The BLM-GFO is concerned that overflights conducted at 500 AGL with any type of aircraft, especially military high speed aircraft, would not be tolerated by the recreating public and those trying to view and photograph wildlife. The expansion area includes some very populated roads within our management area that travel through or are in the vicinity of the Alaska Range. The Denali and Richardson Highways connect two of the largest and most visited National Parks in Alaska. The Denali Highway is a destination for visitors who want to experience a glimpse of the Last Frontier. Visitors come to the Denali Highway to camp, fish, view wildlife and birds, hike, bicycle, canoe, and explore Alaska's geologic and archaeological and historic past. BLM-GFO managed campgrounds and facilities are dispersed across the Denali Highway and down the Richardson Highway. Travelers seeking the solitude of the Last Frontier do not appreciate experiencing military maneuvers taking place along these routes, especially when there is a vast amount of remote lands within the State of Alaska that could be alternately utilized. The BLM-GFO would like ALCOLM to consider alternative areas in Alaska for these maneuvers that would be more appropriate and isolated from the recreating public and federally managed recreation areas.

Trails and Travel Management:
The BLM-GFO documented 10,039 trail users in Fiscal Year 2010 within the current Fox 3 and proposed MOA areas. Dispersed recreation totals add an additional 28,500 visitors within this area. Within the proposed Paxson MOA area during the same time frame, 10,035 trail users were counted and dispersed recreation counts added an additional 6,448 visitors within this area. For both of these areas, generally the most concentrated use occurs in conjunction with hunting seasons (August and September). Use does occur year round however, generally decreasing in

intensity the further away you travel from the road system. The exception is some areas within the proposed Paxson MOA which has significant snowmachine use and non-motorized winter activities within the Delta Range Special Recreation Management Area.

The duration and frequency of flights would obviously affect experiences as would flight floor levels. Without knowing how many flights may take place, it is difficult for the BLM-GFO to analyze the potential effects. Essentially a couple of planes per day or every few days would have far less effects than aerial operations taking place on a daily basis or a large group of planes in a single formation. The Recreation Opportunity Spectrum (ROS) classifications were determined during the BLM-GFO East Alaska Resource Management Plan process which was completed in 2007. These ROS classifications guide the BLM-GFO recreation management objectives for all lands managed by this office. A review of these classifications may help to determine how to meet the JPARC's needs while protecting user experiences and management objectives.

Wildlife and Subsistence:
Wildlife resources in conjunction with subsistence uses are extensively utilized within the proposed area. A significant expansion to the south and east of the current Fox 3 MOA boundary, to include the proposed Paxson MOA, will likely affect wildlife and subsistence activities at certain times of the year. From January till March, the Nelchina Caribou Herd is scattered through much of the eastern part of the proposed Fox 3 MOA and within the proposed Paxson MOA Addition, with an active federal subsistence hunt that ends March 30 of each year along the Delta and Gulkana Wild and Scenic River corridors. Wintering moose generally congregate at higher elevations and, relevant to subsistence uses and JPARC's proposed MOAs, within the Alphabet Hills system. Human disturbance increases stress in overwintering moose during an already-stressful time of the year. Snow conditions may also contribute to stress levels as moose move around and search for forage in the snow. From April till June, migratory birds arrive in the proposed area to mate and nest. Subsistence users utilize the Tangle Lakes and nearby lakes for the spring migratory bird subsistence hunt. Caribou calves are born mid-May within the Talkeetna Mountains, within the western half of the existing and the proposed Fox 3 MOA. By July, fledglings begin to fatten up for the trip south. Trumpeter Swans (a BLM sensitive species) congregate in large lakes during this time. August till September is moose hunting season as well as the start of caribou hunting season. Federal subsistence hunters and state hunters congregate in the area for the prospect of bagging a moose or caribou. Subsistence use significantly increases during this time. By October, the fall caribou migration is in full swing. Hunters congregate along the Richardson Highway within the proposed Paxson MOA addition for the resumption of the winter caribou hunt. The subsistence caribou hunt continues in November and December but at a slower pace as the caribou continue their eastward movement to wintering grounds. Moose begin to congregate and move towards higher elevations and their digestive tract begins to adapt to winter forage. This is generally a quiet time when animals prepare for the winter.

The degree to which the proposed action may affect wildlife depends largely on noise level, frequency of activity, the intensity of the activity, and the wildlife community that is present at the time of the activity. The social significance of the area in terms of federal subsistence use also needs to be considered.

Documented Noise Sensitive Areas:
The BLM-GFO would like to bring ALCOM to the attention of their own map provided on page 14 of the JPARC Modernization and Enhancement EIS handout provided at scoping meetings in Glennallen. The map titled "Proposed Night Joint Training Special Use Airspace" documents known noise sensitive areas. The BLM-GFO would like ALCOM to continue to recognize these documented noise sensitive areas that were created during the last planning period and would also request that they be reviewed and updated to reflect current use and resource issues (see attached pdf titled, "Noise/Flight Sensitive Area List (current as of November 1996)." Some of these documented areas coincide with several of the locations presented in these comments, namely the Delta and Gulkana Wild and Scenic Rivers, and areas utilized by migratory birds, nesting waterfowl, and calving moose and caribou.

Planning Process:
The JPARC planning newsletter dated 12.03.10 shows that ALCOM is in the scoping phase for the JPARC EIS. However, throughout the document, alternatives A, B, C, and D as well as the No Action Alternative are already being proposed. The use of the word "alternatives" during the scoping phase of a National Environmental Policy Act (NEPA) planning process is confusing. Scoping should provide an opportunity to develop issues that then lead to the development of alternatives in a Draft EIS.
Thank you for the opportunity to comment. Our office looks forward to working with ALCOM throughout the JPARC EIS planning period to mitigate concerns and to suggest alternatives. If you have additional questions, please contact our office at 907-822-3217.

Sincerely,

Beth Maclean

Beth Maclean
Field Manager

Enclosure(s):

1. East Alaska Proposed Resource Management Plan and Final EIS (cd)
2. East Alaska Resource Management Plan Record of Decision and Approved Plan (cd)
3. Gulkana National Wild River Record of Decision Final Environmental Assessment and Revised River Management Plan
4. Draft Environmental Assessment for the Delta River Special Recreation Management Area Plan and East Alaska Resource Management Plan Amendment
5. Over flights 2007
6. Over flights 2000
7. Summary of comments to Draft EA for the Delta River SRMA Plan and East Alaska RMP Amendment
8. Noise/Flight Sensitive Area List (current as of November 1996)"

Kari Rogers/GFO/AK/BLM/DOI
05/30/2007 04:02 PM
To
Heath Emmons/GFO/AK/BLM/DOI@BLM, William Runnoe/GFO/AK/BLM/DOI@BLM
cc
Bruce E Rogers/GFO/AK/BLM/DOI@BLM, Ramone McCoy/GFO/AK/BLM/DOI@BLM
bcc

Subject
military overflight in the Delta WSR corridor

Today, 30 May 2007 at about 1 p.m., while I was driving south on the Richardson Highway near MP 207 adjacent to the Delta Wild and Scenic River corridor, I experienced something like never before. Out of nowhere, there was a deafening blast with repercussion and tremendous roar that absolutely scared me to death. My first thought was that my truck had exploded and I hit the brakes and pulled off the highway immediately. The roar continued as I jumped out of the truck; then another deafening blast and roar hit and I saw an F-16 jet blasting downriver above the Delta River, scarcely 200 feet above the water. The jet was visible for only a moment or two before disappearing around a bend in the river. It banked hard around the corner and flipped 90 degrees to maneuver, like you see them do in the movies.

It was an impressive sight, but not something that I expected to see that close to the ground or within the Delta WSR corridor.

Kari

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Military Overflights
Delta National Wild and Scenic River
Gulkana National Wild River
Summer 2000

To files:

On July 17, 2000, BLM staff (Kathy Liska, Brian Glaspell, Denton Hamby and Heath Emmons) left the Delta NWSR Wayside boat launch at approximately 2:30pm to canoe through the Upper Tangle Lakes (in the Delta National Wild & Scenic River corridor) and portage to Dickey Lake to float the Middle Fork of the Gulkana River (in the Gulkana National Wild River corridor).

While portaging from Upper Tangle Lake to Mud Lake, the group saw two USAF F-15 aircraft flying overhead from west to east at 1000 agl or lower at 4:05pm. (The cockpits were easily visible, but couldn't make out the shape / forms of the pilots.) The noise was deafening.

The following day (July 18), the group entered the Middle Fork (from Dickey Lake) at approximately 3:15pm. At approximately 3:30pm two USAF F-15 aircraft flew past from west to east at about 1000 agl. The level of flight and noise and flight pattern were similar to that experienced on July 17.

On August 9, 2000, at approximately 4:25 pm, Brian Glaspell and Denton Hamby were just getting out of a canoe at the Delta NWSR Wayside boat launch when multiple sonic booms occurred. The booms were so loud / intense, they nearly knocked them over. They did not immediately spot the plane but shortly after thought they saw the aircraft flying north - northeast.

Another BLM crew was on the Delta River (near Eureka Creek) on August 9 also reported hearing a series of sonic booms about the same time but no aircraft was sighted.

On August 8, Kathy Liska was driving the Denali Highway. At approximately 4:00 pm at MP 85 (west of the Susitna River) a loud roar was followed by a second roar (that was loud enough to be almost overwhelming) caused her to pull off the road until the noise subsided. A passenger car coming in the opposite direction stopped in the middle of the road and driver jumped out and ran to the ditch. No aircraft was sighted.

Kathy Liska

NOISE/FLIGHT SENSITIVE AREA LIST

Current as of November 1996
(Denotes change from previous list)**

**1. Pleasant Valley Subdivision

a. Description: 64° 55' 00"N/147° 00' 00"W to
64° 55' 00"N/146° 45' 00"W to
64° 51' 30"N/146° 45' 00"W to
64° 50' 00"N/146° 50' 00"W to
64° 50' 00"N/147° 00' 00"W to
point of beginning

EIL TACAN 340°R to 007°R
10 to 16 DME

b. Altitude: Surface to 6000' MSL. Other altitudes restricted to non-maneuvering, non-afterburning, navigational flight

c. Time of year: Continuous

2. Chena Recreation Area

a. Description: 65° 00' 00"N/146° 16' 00"W to
65° 00' 00"N/146° 05' 00"W to
64° 52' 00"N/146° 05' 00"W to
64° 49' 00"N/146° 09' 00"W to
64° 49' 00"N/146° 15' 00"W to
64° 51' 00"N/146° 35' 00"W to
64° 55' 33"N/146° 35' 00"W to
64° 57' 00"N/146° 18' 00"W to
point of beginning

b. Altitude: Surface to 1500' AGL

c. Time of year: 1 May to 30 Sep

3. Chena Hot Springs Resort

a. Description: Three nautical mile radius around 65° 03' 00"N/146° 03' 00"W

b. Altitude: Surface to 1500'AGL

c. Time of year: Continuous

****4. Salcha River Area One**

a. Description:

– 64° 29' 20"N/146° 55' 00"W thence via the 4nm arc
centered at 64° 25' 30"N/146° 51' 00"W counterclockwise to
64° 22' 15"N/146° 46' 00" W to
64° 32' 00"N/146° 05' 00"W to
64° 34' 00"N/146° 15' 00"W to
64° 34' 00"N/146° 35' 00"W to
point of beginning

b. Altitude: Surface to 8000' MSL for turbojet/turbofan aircraft
Surface to 1500' AGL for all other aircraft

c. Time of year: Continuous

****5. Salcha River Area Two**

a. Description: 64° 34' 00"N/146° 15' 00"W to
64° 37' 00"N/146° 12' 00"W to
64° 41' 00"N/145° 46' 00"W to
64° 40' 00"N/145° 38' 00"W to
64° 32' 00"N/146° 05' 00"W to
point of beginning

b. Altitude: Surface to 1000' AGL continuous
Surface to 5000' MSL 1 Sep to 20 Sep for turbojet/turbofan aircraft

6. Sheep Lambing Area and Newman Creek Airstrip (63° 58' 41"N/147° 15' 42"W)

a. Description: 64° 00' 00"N/148° 00' 00"W to
63° 34' 00"N/148° 00' 00"W to
63° 34' 00"N/146° 24' 00"W to
63° 40' 00"N/146° 58' 00"W to
63° 55' 00"N/147° 15' 00"W to
63° 58' 45"N/147° 13' 20"W to
64° 00' 00"N/147° 15' 00"W to
point of beginning

b. Altitude: Surface to 1500' AGL

c. Time of year: 1 May to 30 Jun

7. Wood River Lodge

a. Description: Three nautical mile radius around 63° 46' 00"N/147° 58' 00"W

b. Altitude: Surface to 1500'AGL

c. Time of year: Continuous

8. Clear Creek Cabins

a. Description: One nautical mile radius around 64° 13' 05"N/146° 13' 00"W

b. Altitude: Surface to 1500'AGL

c. Time of year: Continuous

9. Delta Junction

a. Description: Three nautical mile radius around 64° 02' 30"N/145° 43' 30"W.

b. Altitude: Surface to 1500' AGL

c. Time of year: Continuous

10. Birch Lake State Recreation Site

a. Description: One nautical mile radius around 64° 19' 00"N/146° 39' 00"W

b. Altitude: Surface to 2000' AGL

c. Time of year: 15 May to 30 Sep

****11. Harding Lake - ~~11. Harding Lake~~**

~~a. Description: Two nautical mile radius around 64° 25' 30"N/146° 51' 00"W~~

~~b. Altitude: Surface to 1000' AGL~~

~~c. Time of year: Continuous~~
Replaced by new #4

12. Hog Farm

a. Description: One nautical mile radius around 61° 59' 00"N/147° 01' 00"W

b. Altitude: Surface to 1000' AGL

c. Time of year: Continuous

13. Ryan Lodge

a. Description: One nautical mile radius around 62° 02' 00"N/146° 40' 00"W

b. Altitude: Surface to 1500' AGL

c. Time of year: Continuous

14. Parks Highway

a. Description: Two nautical miles either side of the highway from Willow, 61° 45' 00"N/150° 02' 00"W, to Palmer, 61° 36' 00"N/149° 07' 00"W

b. Altitude: Surface to 500' AGL

c. Time of year: Continuous

15. Glenn Highway

a. Description: Two nautical miles either side of Glenn Highway from Sheep mountain NDB, 61° 49' 00"N/147° 30' 00"W, to Palmer, 61° 36' 00"N/149° 07' 00"W

b. Altitude: Surface to 1000' AGL

c. Time of year: Continuous

16. Denali Highway

a. Description: Five nautical miles either side of the road from the park entrance, 63° 44' 00"N/148° 55' 00"W, to Kantishna, 63° 32' 00"N/150° 57' 00"W

b. Altitude: Surface to 2000' AGL

c. Time of year: 15 May to 15 Sep

17. Yukon MOAs Peregrine Falcon Areas

a. Description: Two nautical miles either side of riverbank

Upper Yukon River: 64° 41' 00"N/141° 00' 00"W to 65° 46' 00"N/144° 00' 00"W

Charley River: 64° 41' 00"N/143° 38' 00"W to 65° 19' 00"N/142° 46' 00"W

Kandick River: 65° 44' 00"N/141° 17' 00"W to 65° 22' 00"N/142° 30' 00"W

Porcupine River: 67° 24' 00"N/141° 00' 00"W to 66° 59' 00"N/143° 08' 00"W

b. Altitude: Surface to 2000' AGL

c. Time of year: 15 Apr to 31 Aug

18. Fox Farm

a. Description: One nautical mile radius around 64° 09' 12"N/145° 52' 30"W

b. Altitude: Surface to 1000' AGL

c. Time of year: 1 Feb to 1 Jul

19. Delta National Wild and Scenic River

a. Description: Five nautical miles either side of the river from 63° 03' 00"N/145° 59' 00"W to 63° 34' 00"N/145° 53' 00"W

b. Altitude: Surface to 5000' MSL

c. Time of year: 27 Jun to 11 Jul

20. Mulchatna River Fishing Lodge

a. Description: One nautical mile radius around 60° 24' 00"N/155° 54' 00"W

b. Altitude: Surface to 1500' AGL

c. Time of year: 1 May to 30 Sep

21. Town of Nulato

a. Description: Two nautical mile radius around 64° 43' 00"N/158° 09' 00"W

b. Altitude: Surface to 1000' AGL

c. Time of year: Continuous

22. Healy Lake/Village

a. Description: Three nautical mile radius around 63° 59' 00"N/144° 45' 00"W

b. Altitude: Surface to 6000' MSL

c. Time of year: Continuous

23. Fielding Lake State Recreation Sites

a. Description: One nautical mile radius around 63° 10' 00"N/145° 40' 00"W and one nautical mile radius around 63° 11' 12"N/145° 38' 00"W

b. Altitude: Surface to 2000' AGL

c. Time of year: 15 May to 30 Sep

24. Donnelly Creek State Recreation Site

a. Description: One nautical mile radius around 63° 39' 40"N/145° 53' 00"W

b. Altitude: Surface to 2000' AGL

c. Time of year: 15 May to 30 Sep

****25. Summit Lake Lodge** - No longer exists

26. Caribou Calving Area

a. Description: Five nautical miles either side of the line from 62° 17' 00"N/148° 00' 00"W to 62° 43' 00"N/147° 22' 00"W

b. Altitude: Surface to 1000' AGL

c. Time of year: 1 May to 30 Jun

27. Sheep Lambing Area

a. Description: 63° 21' 00"N/145° 05' 00"W to
63° 33' 00"N/144° 05' 00"W to
63° 22' 00"N/144° 05' 00"W to
63° 10' 00"N/145° 05' 00"W to
point of beginning

b. Altitude: Surface to 1000' AGL

c. Time of year: 1 May to 30 Jun

28. Lake George

a. Description: Two nautical mile radius around 63° 47' 00"N/144° 32' 00"W

b. Altitude: Surface to 1500' AGL

c: Time of year: Continuous

29. Shaw Creek Youth Camp

a. Description: One nautical mile radius around 64° 16' 00"N/146° 06' 00"W

b. Altitude: Surface to 1500' AGL

c. Time of year: Continuous

30. Town of Circle City

a. Description: Two nautical mile radius around 65° 50' 00"N 144° 04' 00"W

b. Altitude: Surface to 6000' MSL

c. Time of Year: Continuous

31. Towns of Central and Circle Hot Springs

a. Description: 65° 35' 00"N/144° 55' 00"W to
65° 38' 00"N/144° 45' 00"W to
65° 29' 00"N/144° 30' 00"W to
65° 26' 00"N/144° 39' 00"W to
point of beginning

b. Altitude: Surface to 10,000' MSL

c. Time of Year: Continuous

32. Mouth of Alexander Creek

a. Description: One nautical mile radius around 61° 25' 00"N/150° 35' 00"W

b. Altitude: Surface to 1500' AGL

c. Time of Year: 1 May to 1 Oct

33. Mouth of Lake Creek

a. Description: One nautical mile radius around 61° 54' 18"N/150° 54' 30"W

b. Altitude: Surface to 1500' AGL

c. Time of Year: 1 May to 1 Oct

34. Mouth of Kroto (Deshka) Creek

a. Description: One nautical mile radius around 61° 42' 00"N/150° 18' 18"W

b. Altitude: Surface to 1500' AGL

c. Time of Year: 1 May to 1 Oct

35. Neil Lake

a. Description: One nautical mile radius around 61° 56' 00"N/150° 23' 00"W

b. Altitude: Surface to 1500' AGL

c. Time of Year: 1 May to 1 Oct

36. Gulkana National Wild and Scenic River

a. Description: Five nautical miles either side of the river from 62° 52' 00"N/ 145° 36' 00"W to 62° 31' 00"N/145° 31' 00"W

b. Altitude: Surface to 5000' MSL

c. Time of year: 27 Jun to 11 Jul

37. Towns of Central and Circle Hot Springs (Supersonic operations)

a. Description: No supersonic operations within a ten nautical mile radius of 65° 31' 00"N/144° 43' 00"W

b. Altitude: Surface to FL350

c. Time of year: Continuous

****38. Hunting Season in the Yukon MOA** - Replaced by #4, #5, and #40

39. Gold King Creek Airstrip

a. Description: Three nautical mile radius around 64° 10' 29"N/147° 56' 00"W

b. Altitude: Surface to 1500' AGL

c. Time of Year: Continuous

****40. Salcha River Area Three**

a. Description: Two nautical miles either side of Salcha River from 64° 39' 30"N/145° 45' 00"W to 64° 39' 00"N/145° 20' 15"W

b. Altitude: Surface to 5000' MSL for turbojet/turbofan aircraft
Surface to 1000' AGL for all other aircraft

c. Time of Year: 1 Sep to 20 Sep

****41. Caribou Hunting Area**

a. Description: Five nautical miles either side of the line from 62° 51' 00"N/147° 09' 00"W to 62° 59' 00"N/145° 54' 00"W

b. Altitude: Surface to 1000' AGL

c. Time of Year: 1 Aug to 30 Sep

DISTRIBUTION LIST

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962 AACS/DO
354 FW/CC
354 FW/PA
354 OG/CC
354 OSS/CC
18 FS/DO
355 FS/DO
353 CTS/DO

Info:
AFREP
ALCOM/PA
611 CES/CEVP
168 ARG/DO, Eielson
176 OG/CC, Kulis
Federal Aviation Administration, AAL-535
HHC 4-123 Aviation Battalion, Wainwright
Utility Airplane Det (Army C-12), Elmendorf
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